International Islamic University Chittagong

Data Structure Project Lab Report (3rd Semester)

Course Code: CSE-2322

Project Name: Dictionary using Binary Search Tree (BST)

Group Name: Code_Crafters

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Introduction:

The purpose of this project is to develop a dictionary application using a Binary Search Tree (BST) as the underlying data structure. The dictionary allows for efficient storage, retrieval, and management of word definitions. The BST is chosen for its efficient search, insert, and delete operations, which operate in average-case O(log n) time complexity.

Features:

1. **Word Insertion**: Allows the user to insert new words along with their definitions.
2. **Word Search**: Enables users to search for words and retrieve their definitions.
3. **Word Deletion**: Provides functionality to delete words from the dictionary.
4. **Display Dictionary**: Prints the entire dictionary in alphabetical order.
5. **Update Definition**: Allows updating the definition of an existing word.

Implementation:

Flowchart for Insertion of a Word:

Start

Input Word and Definition

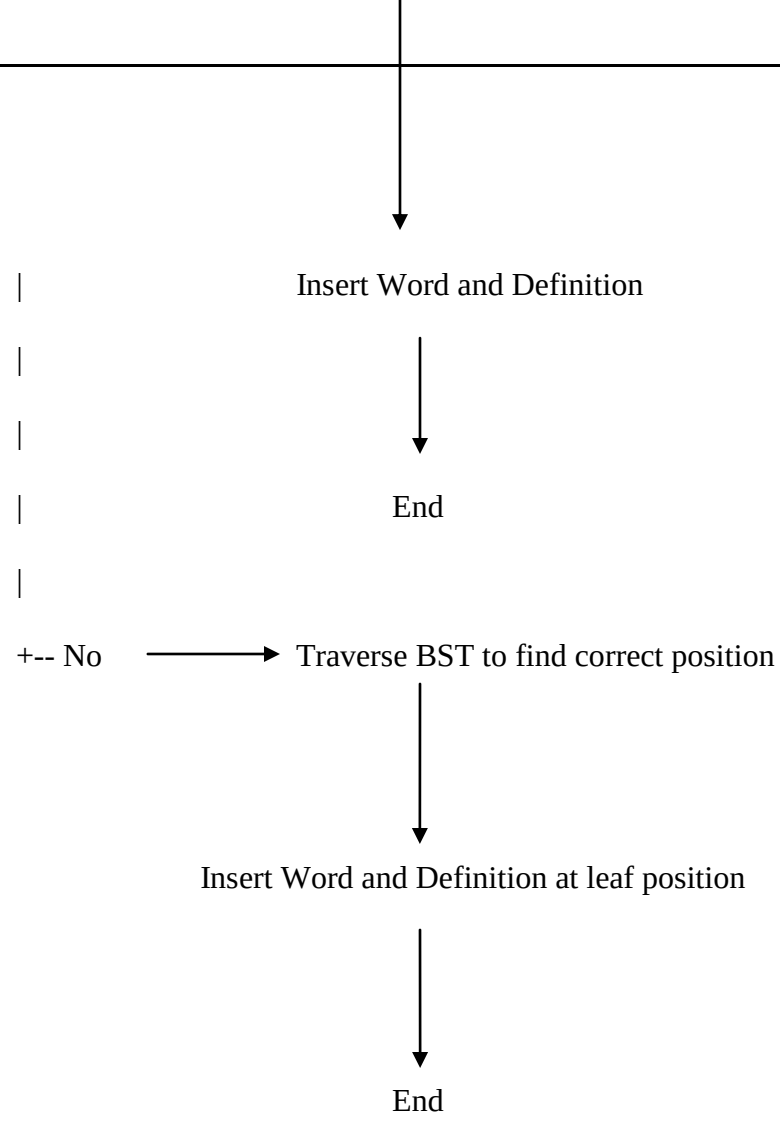
Is the BST empty?

|

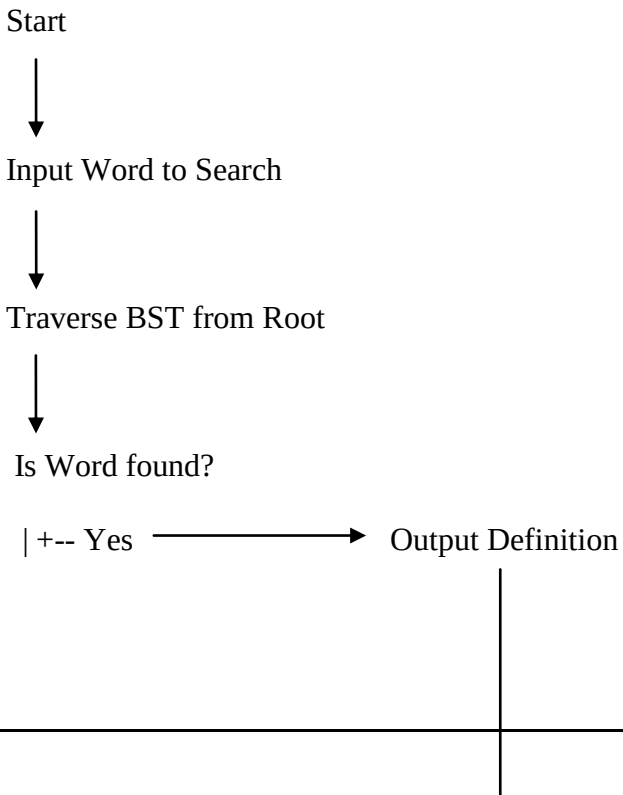
+-- Yes ⟶ Create Root Node

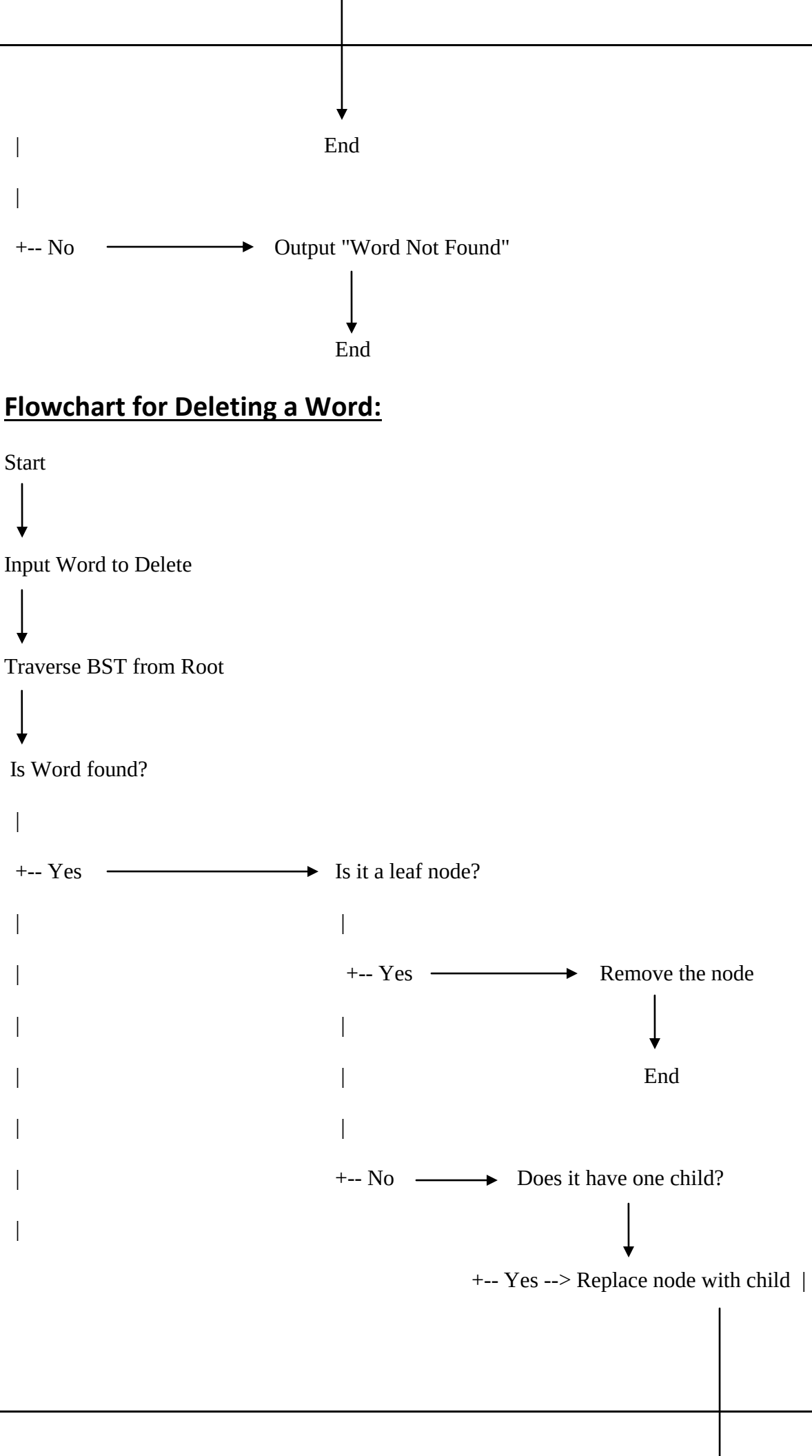
|

|

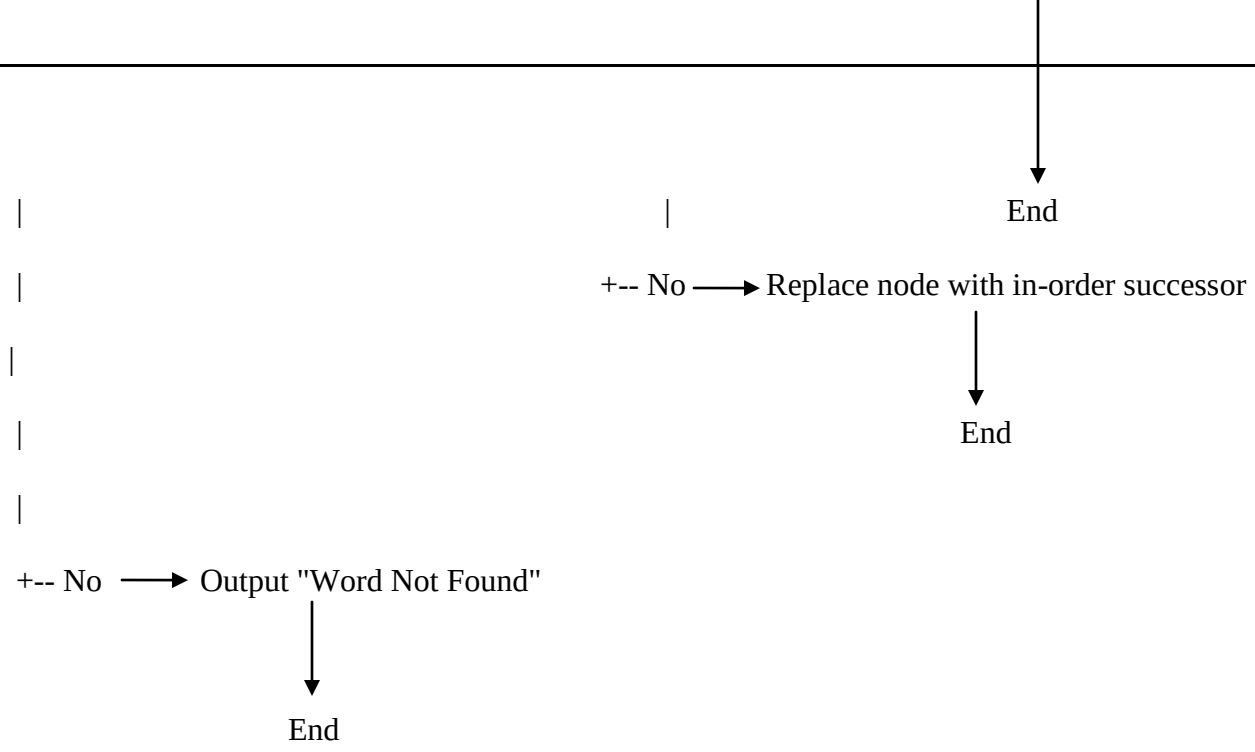


Flowchart for Searching a Word:





Flowchart for Deleting a Word:



Functions Used:

1. `insert(word, definition)`

- **Description**: Inserts a word and its definition into the BST.
- **Parameters**:
  - `word`: The word to be inserted.
  - `definition`: The definition of the word.

2. `search(word)`

- **Description**: Searches for a word in the BST and returns its definition.
- **Parameters**:
  - `word`: The word to be searched.

3. `delete(word)`

- **Description**: Deletes a word and its definition from the BST.
- **Parameters**:
  - `word`: The word to be deleted.

4. `update(word, new_definition)`

- **Description**: Updates the definition of an existing word.
- **Parameters**:
  - `word`: The word to be updated.
  - `new_definition`: The new definition of the word.

5. `display_in_order()`

- **Description**: Displays all words and their definitions in alphabetical order.
- **Parameters**: None.

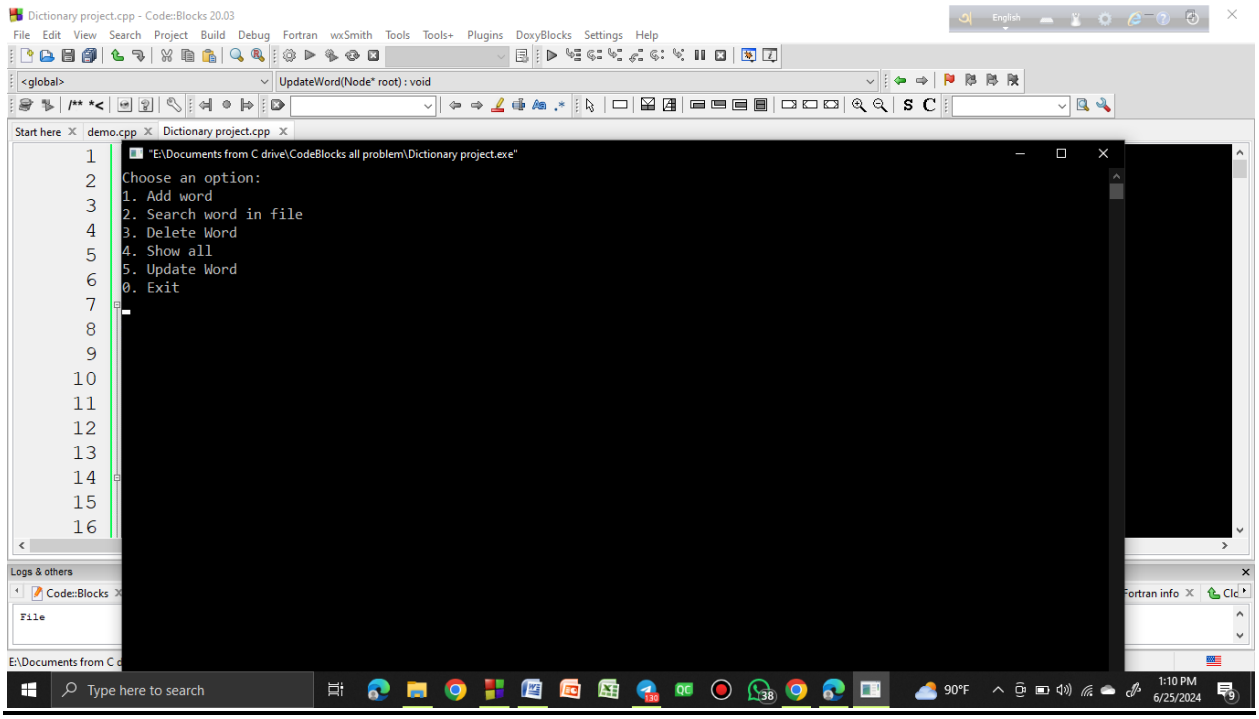
Implementation Details:

- **Node Structure**: Each node in the BST contains a `word`, its `definition`, and pointers to the left and right children.
- **BST Operations**: The BST supports the standard operations of insertion, deletion, and in-order traversal, which are adapted to handle the word-definition pairs.

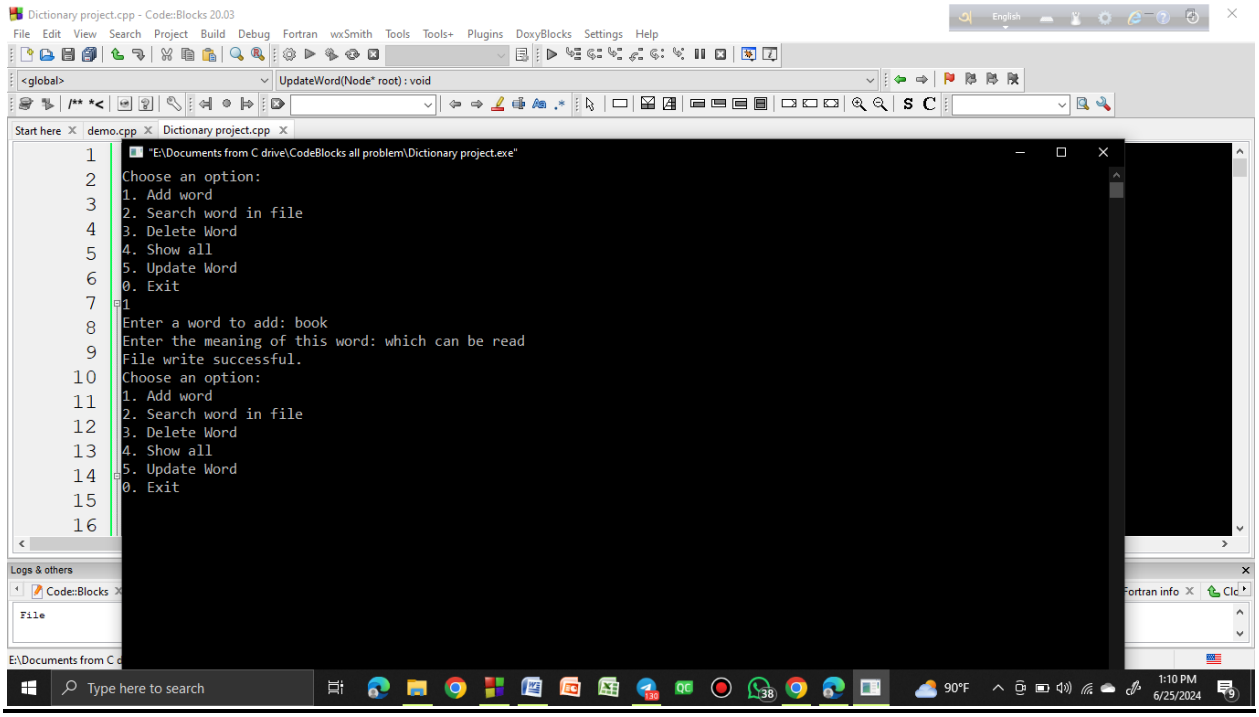
Screen Shots:

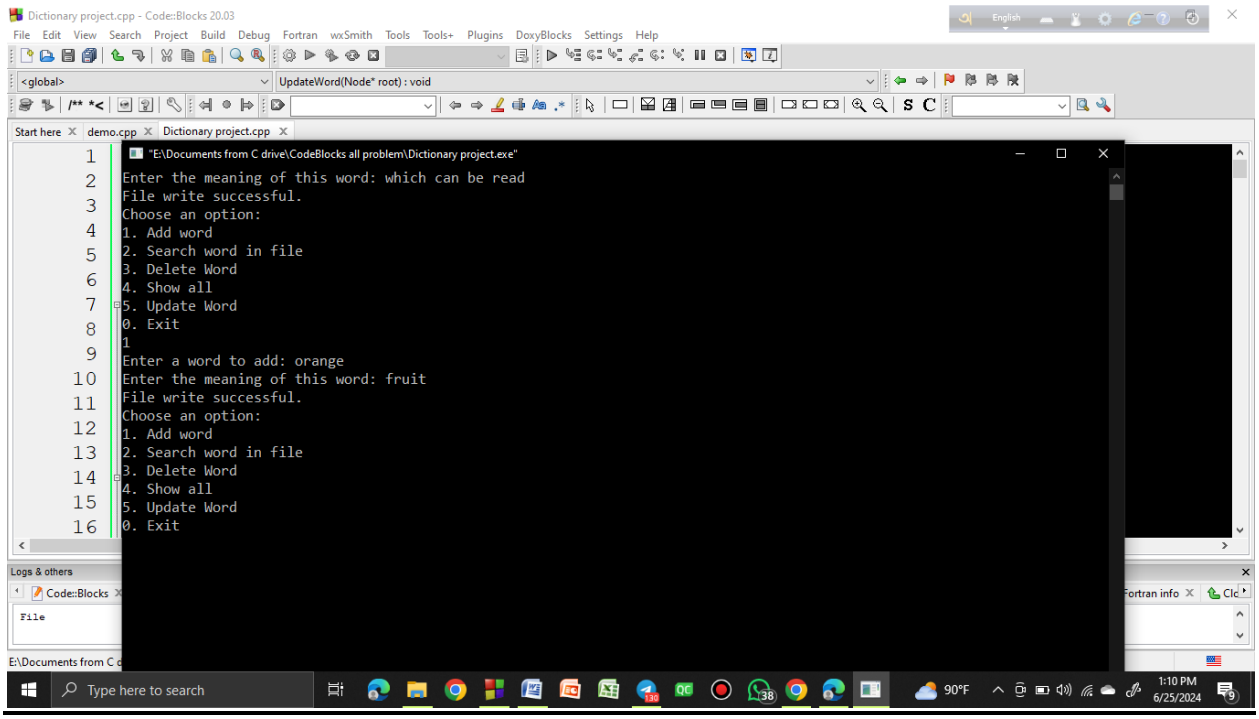
If part:

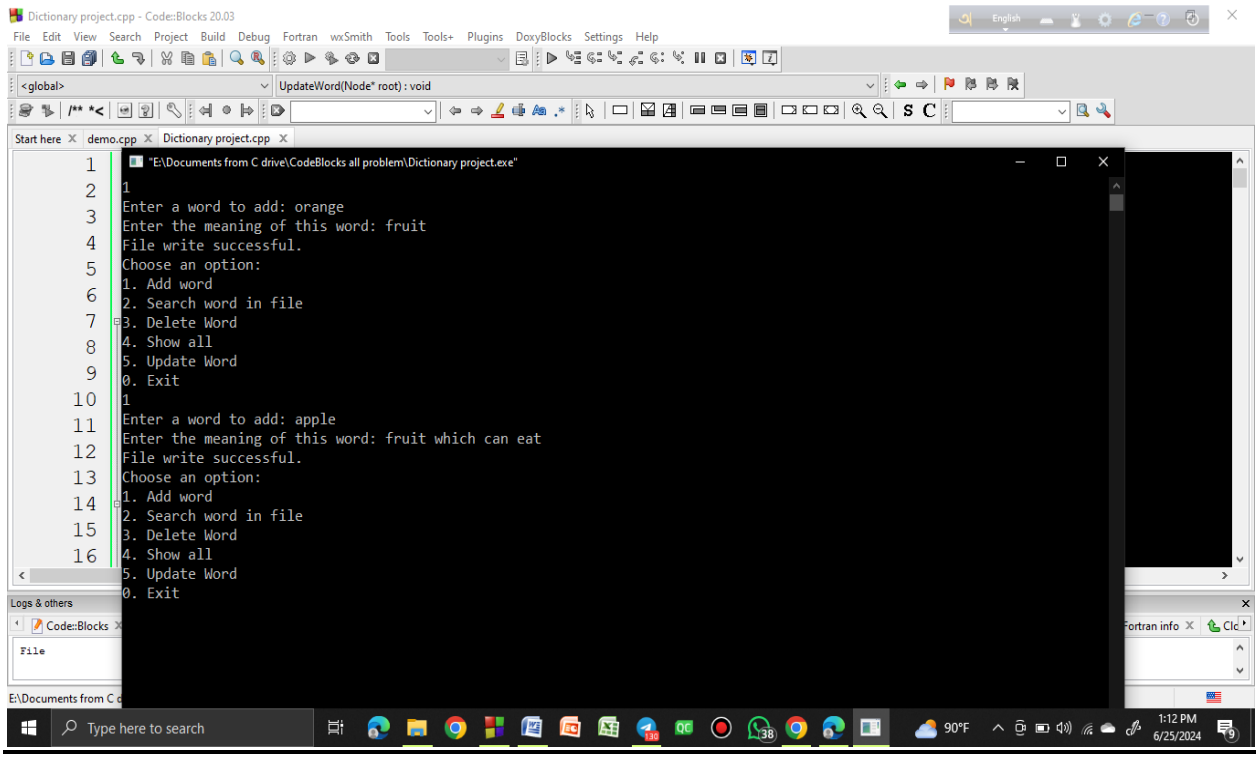
Main menu:

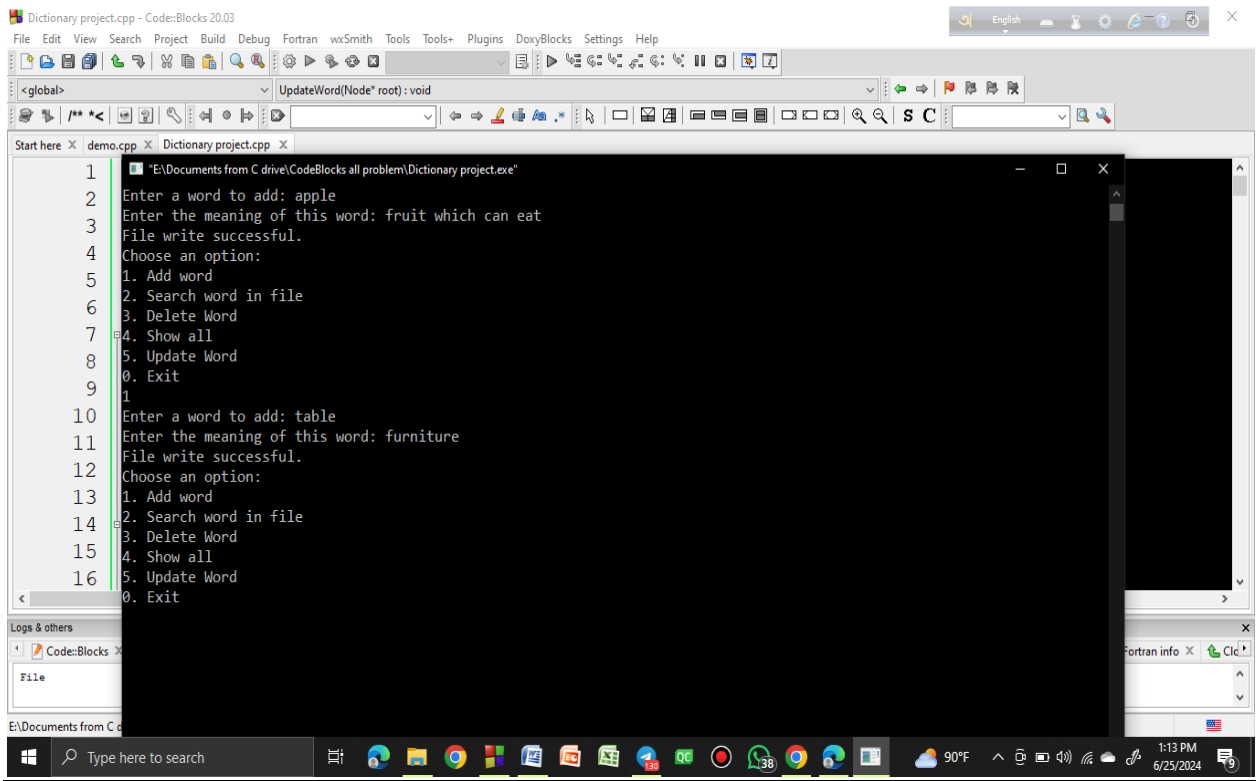


Add Word:

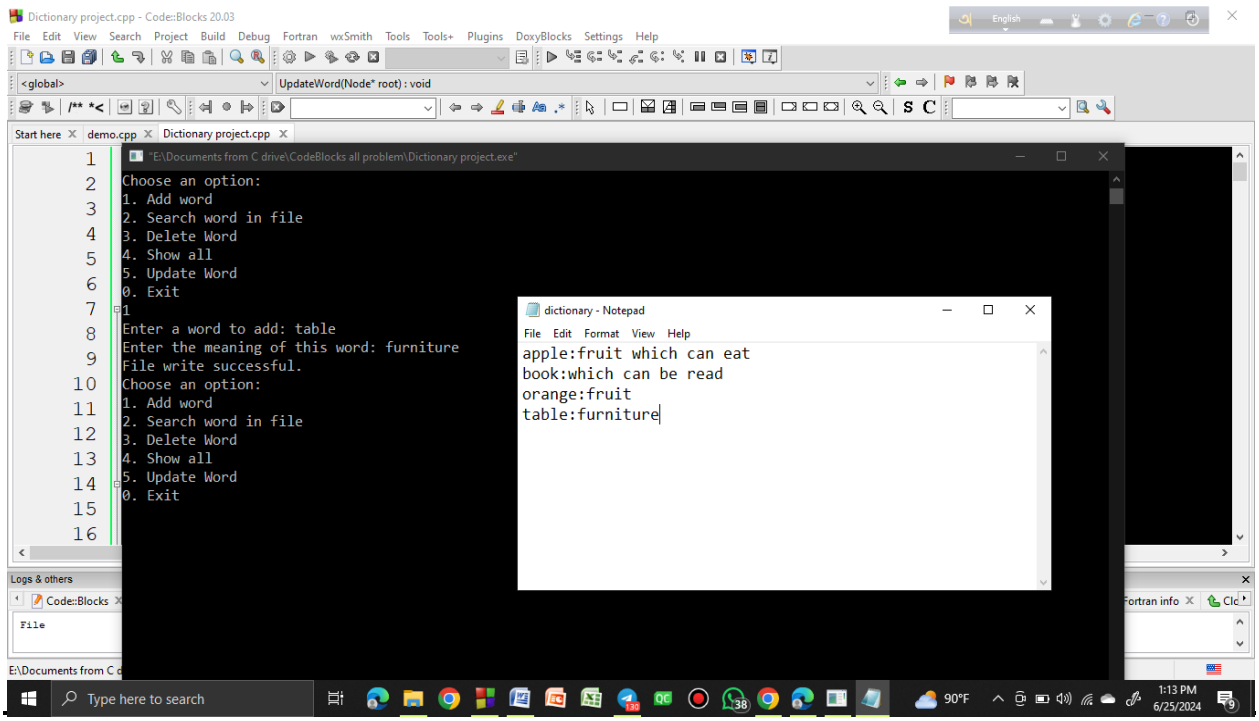

Dictionary project.cpp - Code::Blocks 20.03
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
1
Enter a word to add: book
Enter the meaning of this word: which can be read
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit


Dictionary project.cpp - Code::Blocks 20.03
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Enter the meaning of this word: which can be read
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
1
Enter a word to add: orange
Enter the meaning of this word: fruit
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit

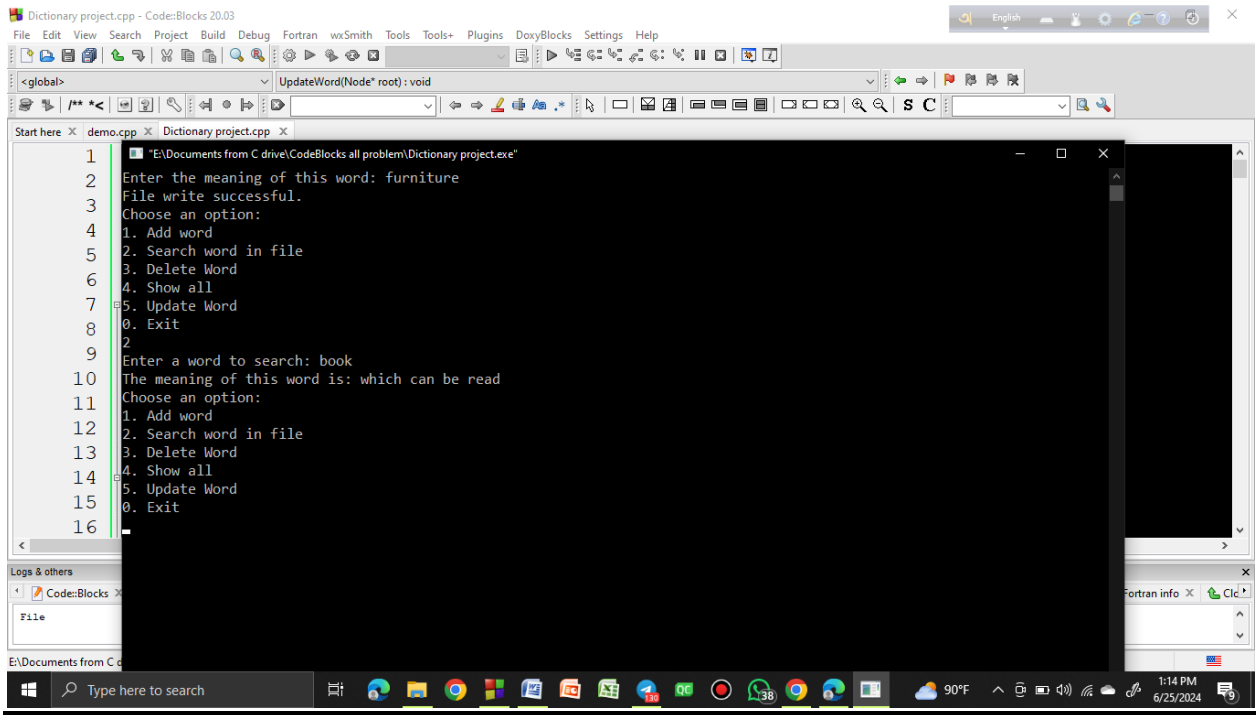

Dictionary project.cpp - Code::Blocks 20.03
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
1
Enter a word to add: orange
Enter the meaning of this word: fruit
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
1
Enter a word to add: apple
Enter the meaning of this word: fruit which can eat
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit


Dictionary project.cpp - Code::Blocks 20.03
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Enter a word to add: apple
Enter the meaning of this word: fruit which can eat
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
1
Enter a word to add: table
Enter the meaning of this word: furniture
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit

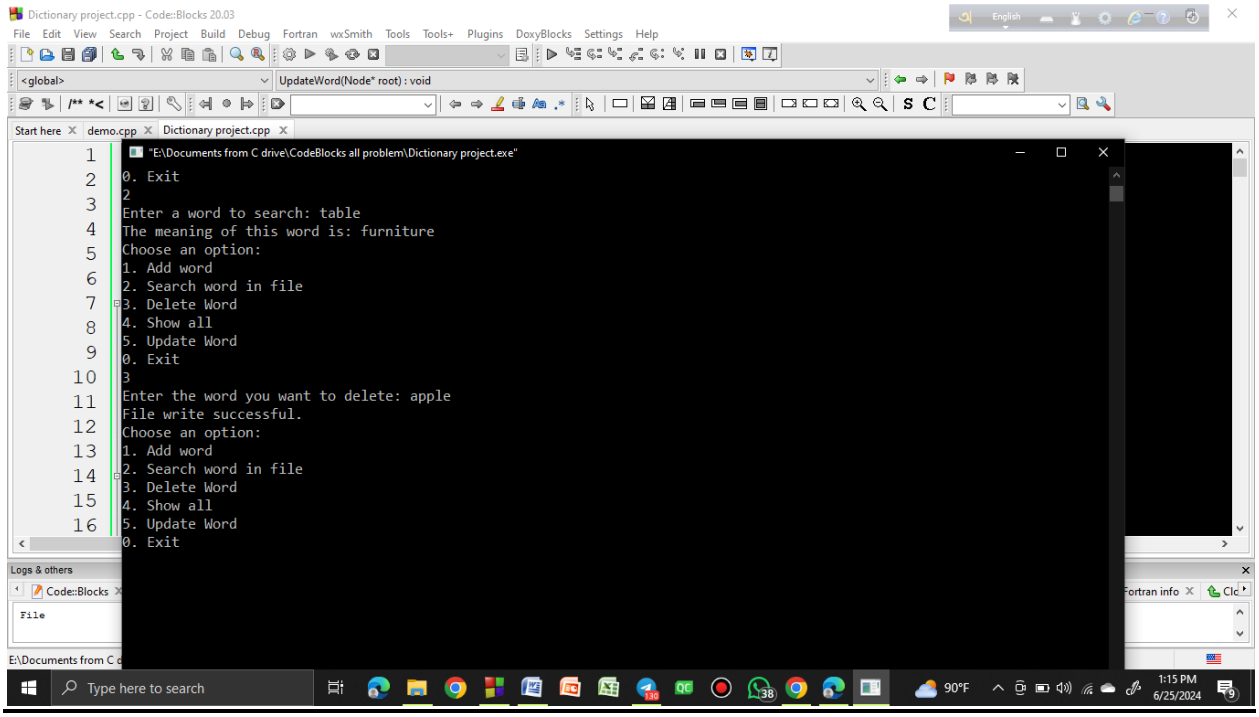
Database after adding words:

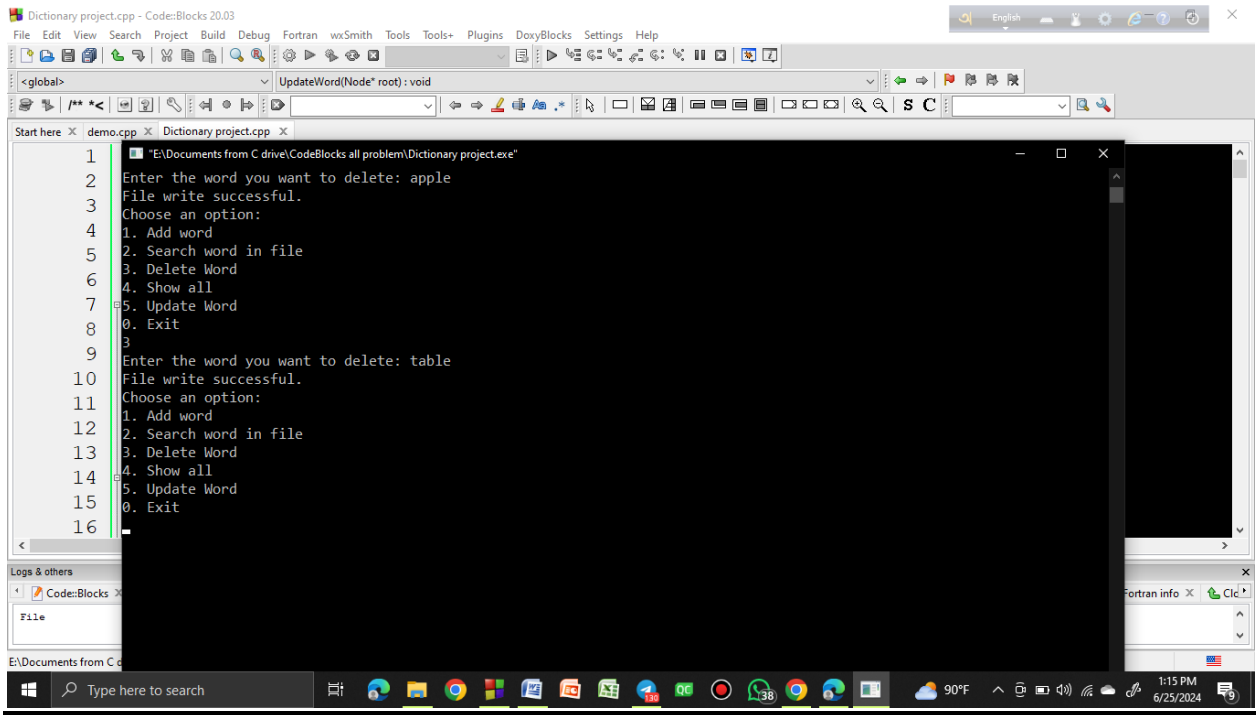


Search word in file:

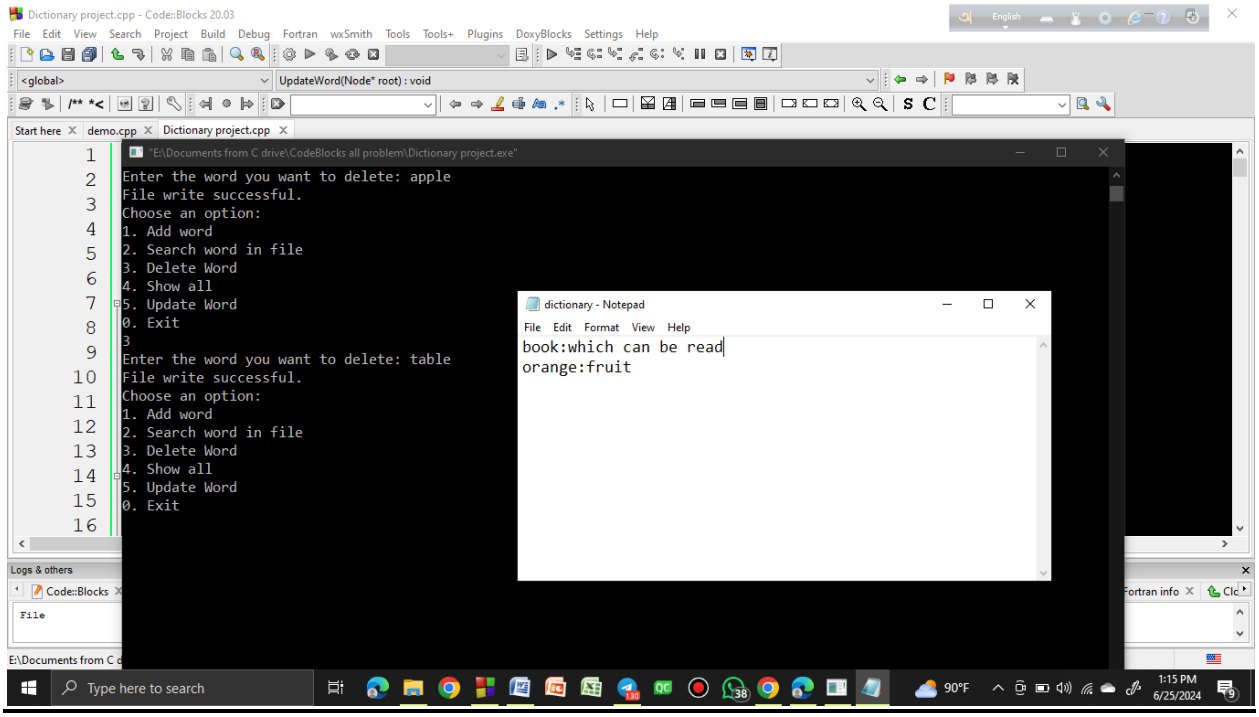


Delete word:

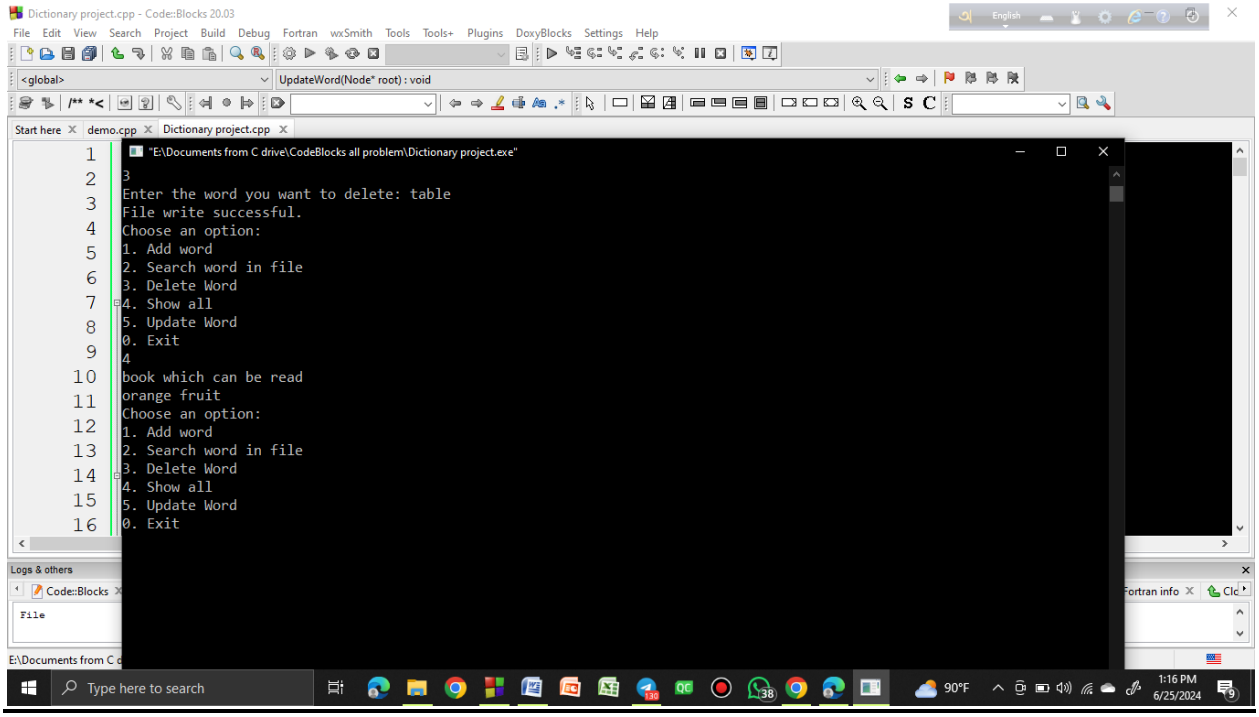

Dictionary project.cpp - Code::Blocks 20.03
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
0. Exit
2
Enter a word to search: table
The meaning of this word is: furniture
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
3
Enter the word you want to delete: apple
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit


Dictionary project.cpp - Code::Blocks 20.03
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Enter the word you want to delete: apple
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
3
Enter the word you want to delete: table
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit

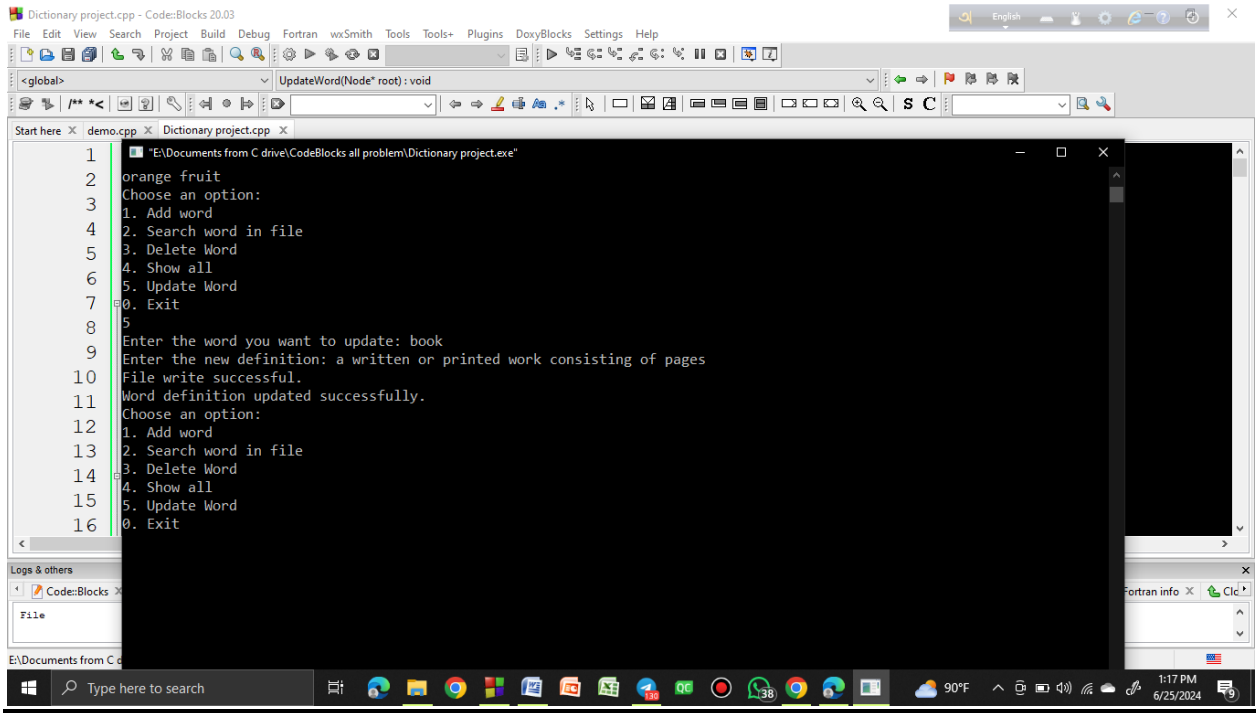
Database after deleting words:



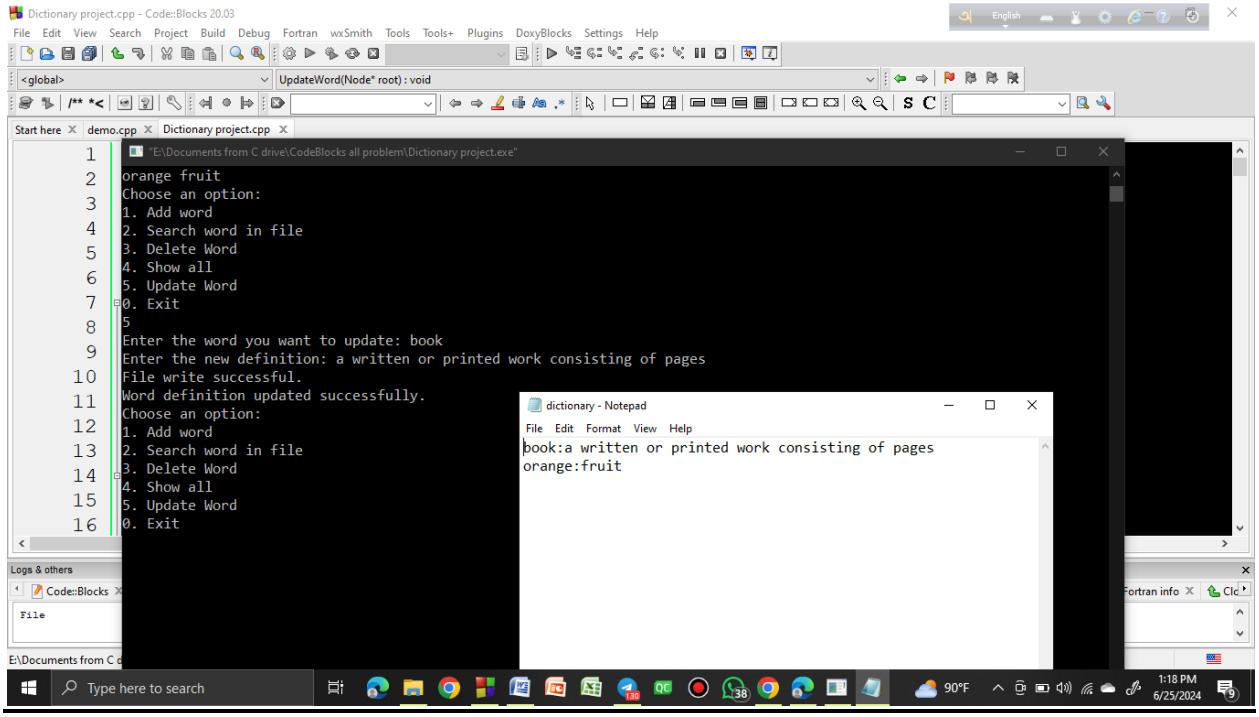
Show all:



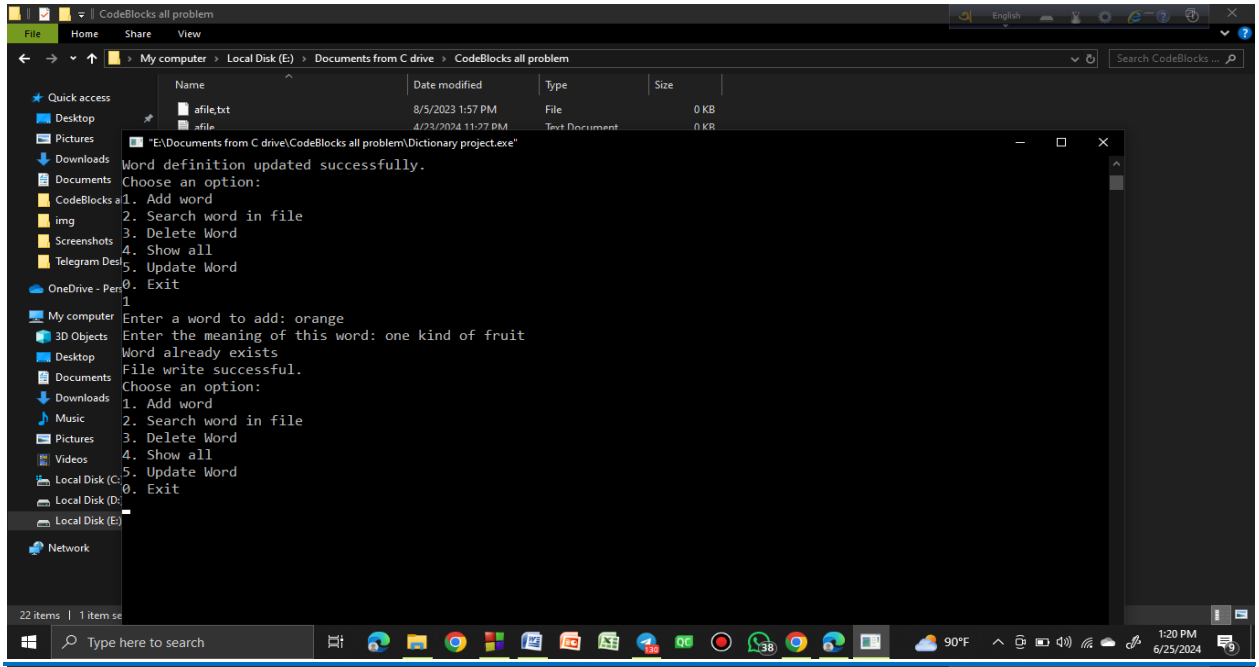
Update word:

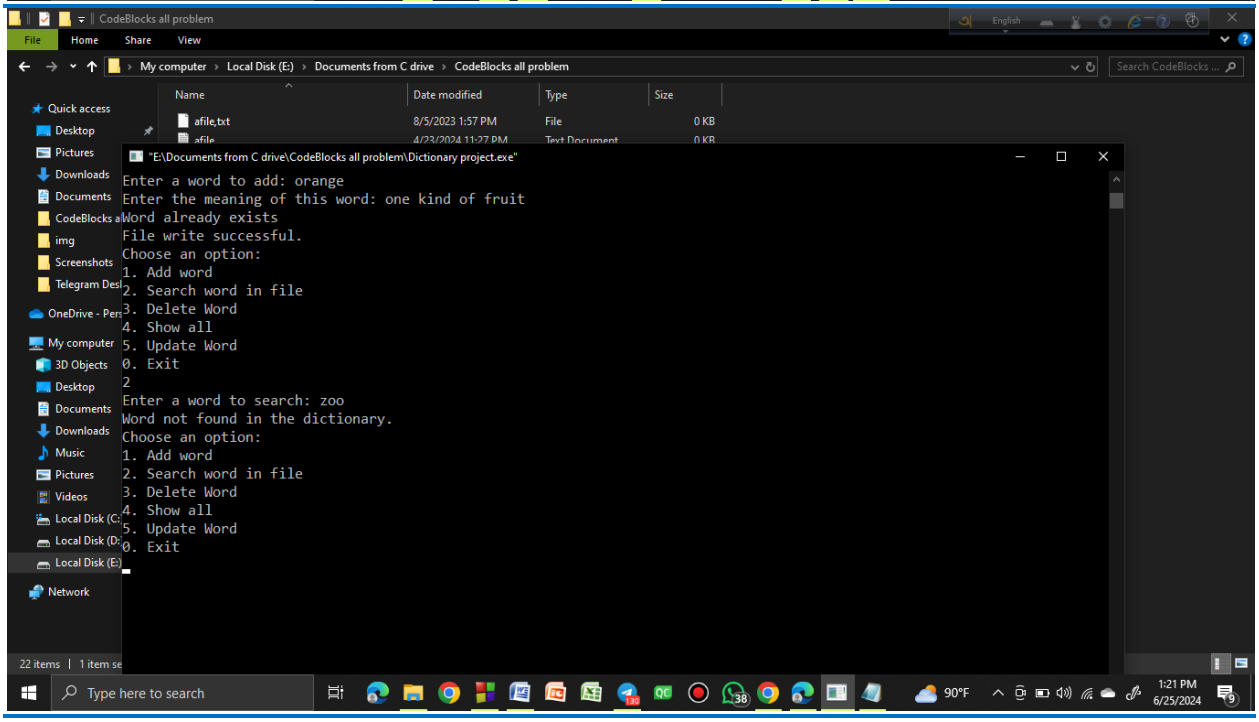


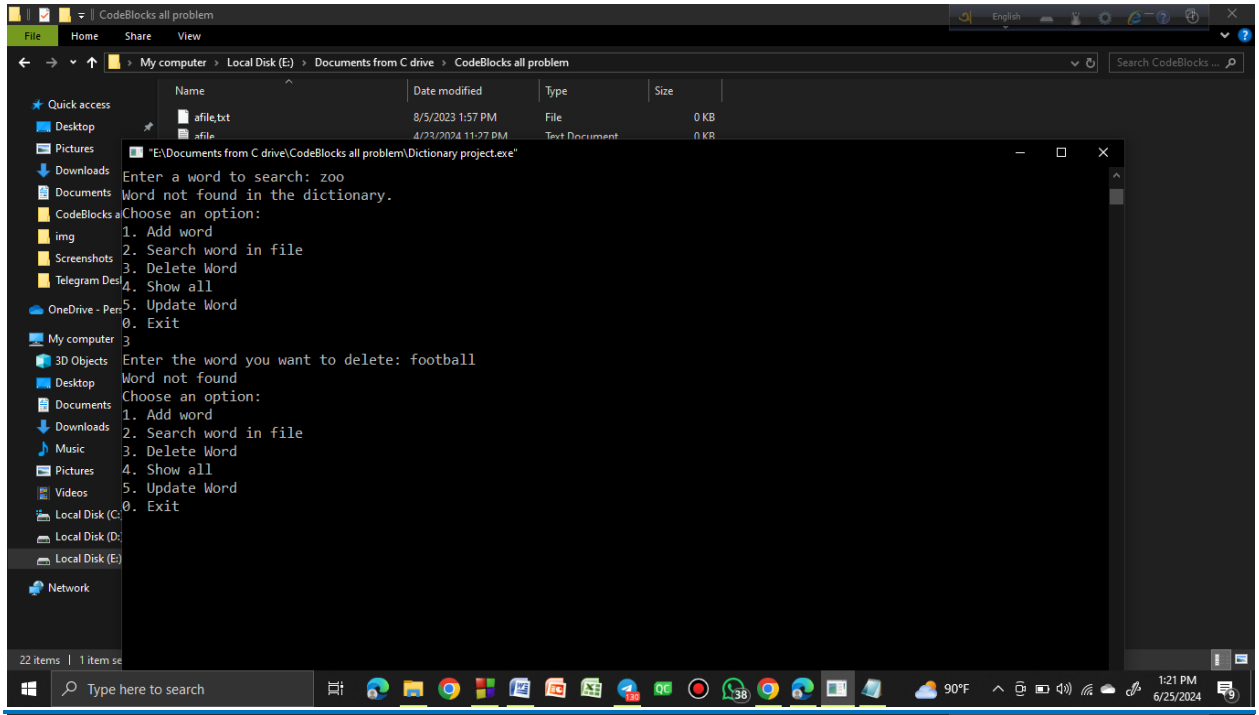
Database after updating words:

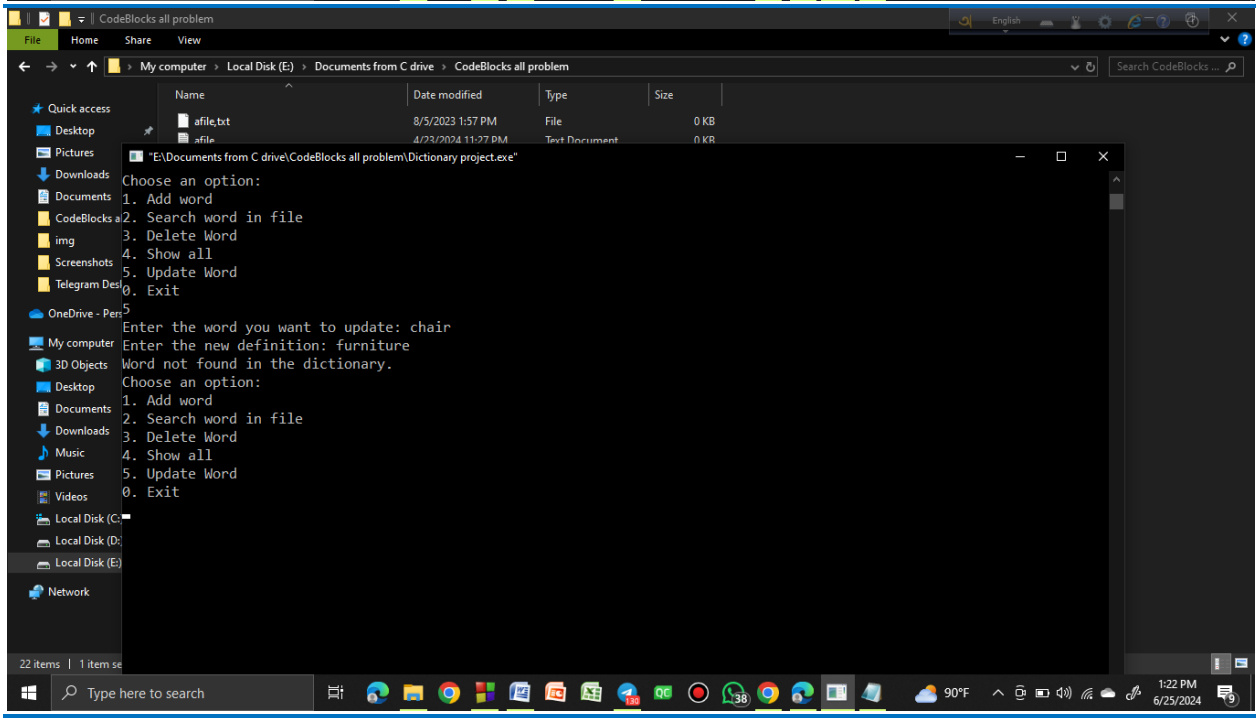


Else part:

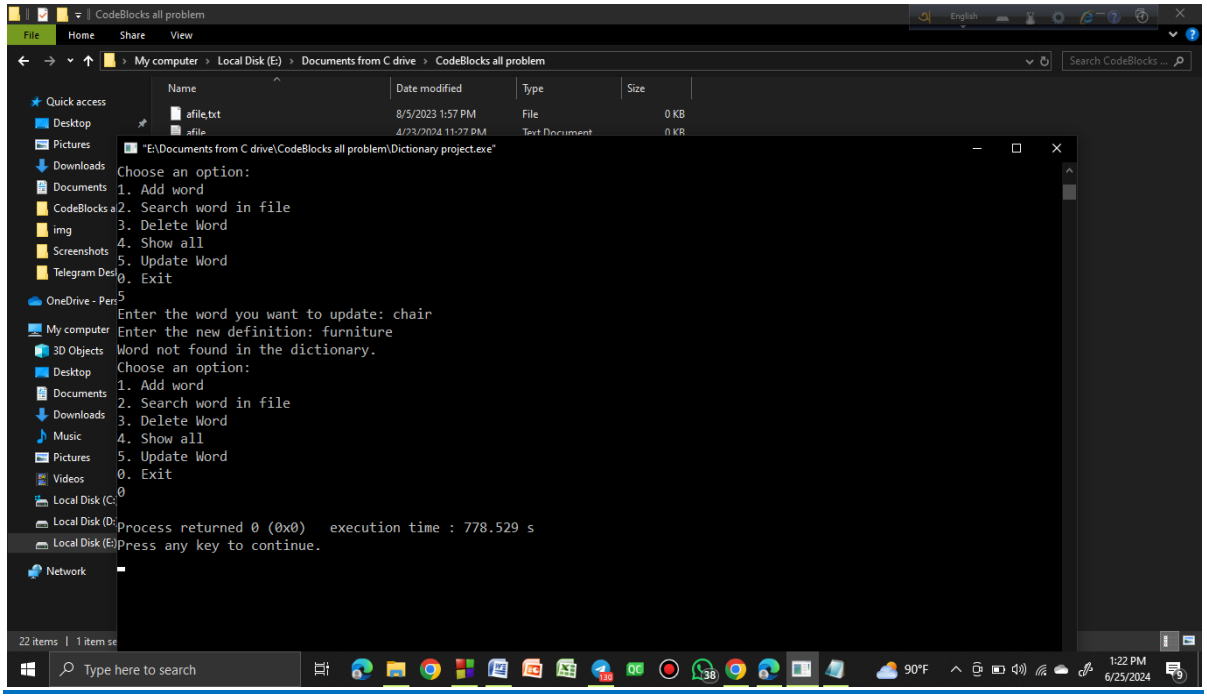

"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Word definition updated successfully.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
1
Enter a word to add: orange
Enter the meaning of this word: one kind of fruit
Word already exists
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit


"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Enter a word to add: orange
Enter the meaning of this word: one kind of fruit
Word already exists
File write successful.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
2
Enter a word to search: zoo
Word not found in the dictionary.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit


CodeBlocks all problem
File Home Share View
My computer › Local Disk (E:) › Documents from C drive › CodeBlocks all problem
Search CodeBlocks ...
Name Date modified Type Size
afile.txt 8/5/2023 1:57 PM File 0 KB
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Enter a word to search: zoo
Word not found in the dictionary.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
3
Enter the word you want to delete: football
Word not found
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
Type here to search
90°F
1:21 PM
6/25/2024


CodeBlocks all problem
File Home Share View
My computer › Local Disk (E:) › Documents from C drive › CodeBlocks all problem
Search CodeBlocks ...
Name Date modified Type Size
afile.txt 8/5/2023 1:57 PM File 0 KB
"E:\Documents from C drive\CodeBlocks all problem\Dictionary project.exe"
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
5
Enter the word you want to update: chair
Enter the new definition: furniture
Word not found in the dictionary.
Choose an option:
1. Add word
2. Search word in file
3. Delete Word
4. Show all
5. Update Word
0. Exit
Type here to search
90°F
1:22 PM
6/25/2024

Exit the program:



Future Plan/Possible Extension:

1. **Graphical User Interface (GUI)**: Develop a user-friendly graphical interface for the dictionary.
2. **Autocomplete Feature**: Implement an autocomplete feature to suggest words as the user types.
3. **Spell Check**: Integrate a spell-check feature to help users find correct words.
4. **Synonyms and Antonyms**: Extend the dictionary to include synonyms and antonyms for each word.
5. **Persistent Storage**: Add functionality to save the dictionary to a file and load it upon program startup.

Conclusion:

The dictionary application using a Binary Search Tree efficiently handles word insertion, search, deletion, and update operations. The project demonstrates the practical application of BST in creating a dynamic and efficient dictionary. Future enhancements such as a GUI, autocomplete, and persistent storage can further improve the usability and functionality of the application.
