Data Structures Assignment 1 Report

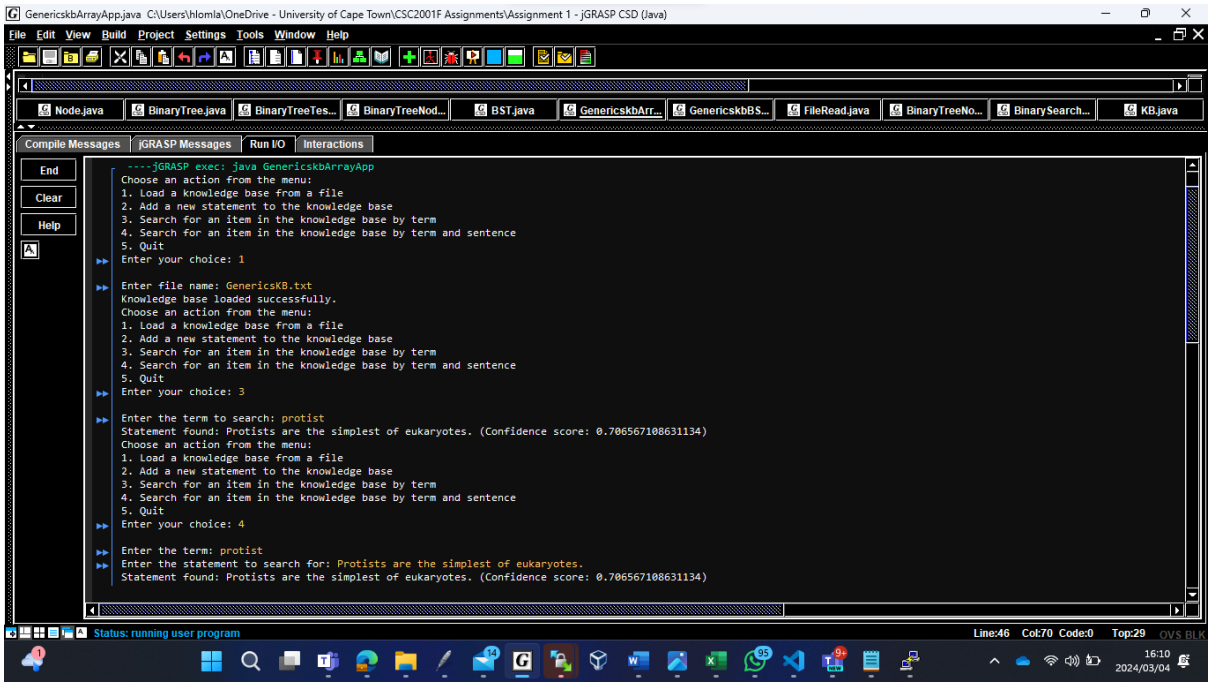
The code that is used for this Assignment relies heavily on code reuse, encapsulation, inheritance, and implementation. The classes that were used are FileRead class, GenericskbArrayApp class, KB class, BST class, Node class, and GenericskbBSTApp class.

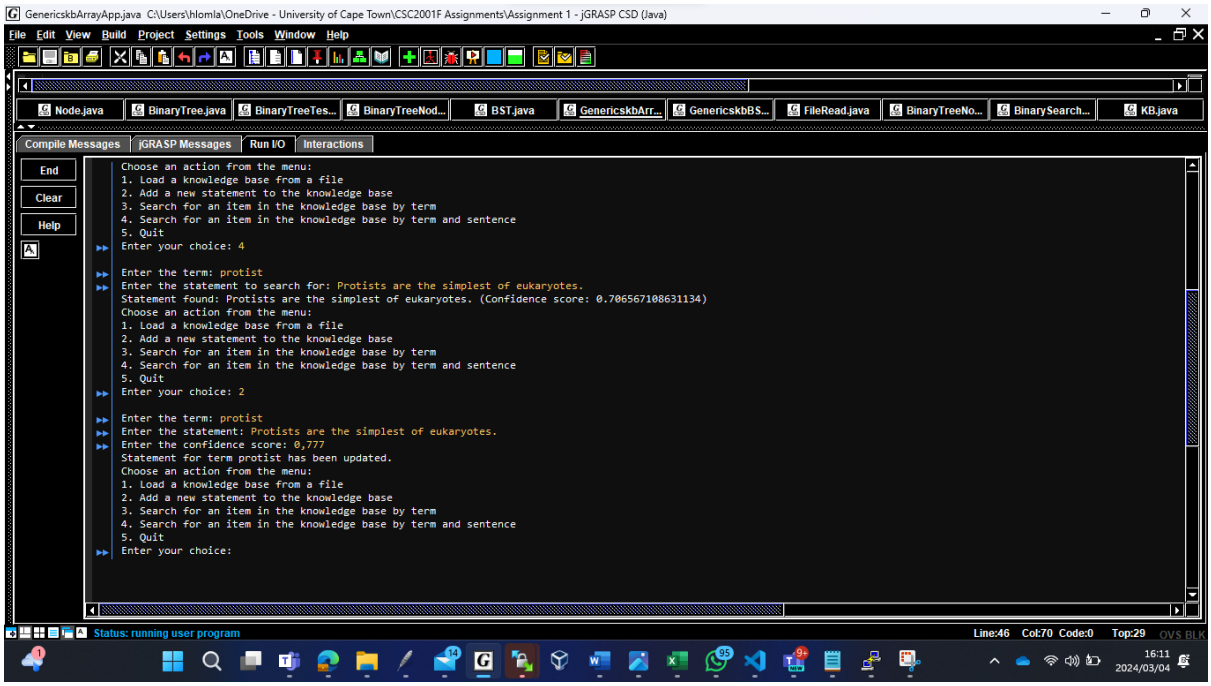
The FileRead class is in charge of reading a knowledge base from a file, updating or adding statements, and doing term-and sentence-based searches for statements. To receive data from files and alter and save knowledge base entries, it communicates directly with the file system and the KB class. A knowledge base entry having a term, a statement related to the word, and a confidence score is represented by the KB class. It offers ways to display the statement, update the statement with a new phrase and score if the new score is higher, set and get the term, sentence, and confidence score, and verify if a given term and sentence match the entry. GenericskbArrayApp class provides a text-based user interface for interacting with the knowledge base. It takes input from the user to perform actions such as loading a knowledge base from a file, adding a new statement to the knowledge base, and searching for items in the knowledge base by term or by both term and sentence. It interacts with the FileRead class to perform these actions. GenericskbArrayApp interacts with the FileRead class by instantiating a FileRead object and calling its methods to perform actions such as reading from a file, adding or updating statements, and searching for items in the knowledge base.FileRead interacts with the KB class by creating `KB` objects to represent knowledge base entries and calling methods of the KB class to manipulate these entries, such as updating statements or checking for matches.

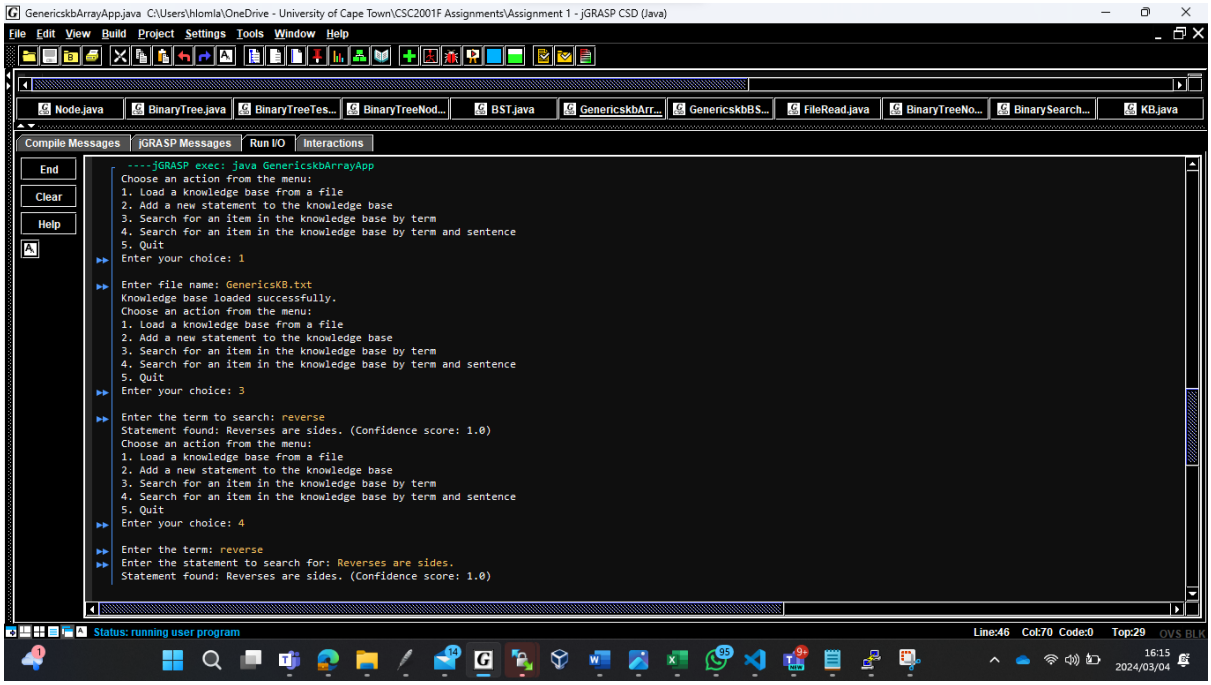
BST class represents the Binary Search Tree data structure. It contains methods for searching, adding or updating, deleting, and traversing the tree. It also includes a method for reading data from a file to populate the tree. The BST class interacts with the Node class to manipulate tree nodes and with the KB class to handle knowledge base entries. Node class represents a node in the BST. Each node holds a reference to left and right child nodes, along with the associated term, sentence, and score. Nodes are created and manipulated by the BST class. They store knowledge base entries inherited from the KB class. KB Class represents a knowledge base entry. It contains instance variables for term, sentence, and score, along with methods to set and get these values. The KB class serves as the blueprint for creating knowledge base entries stored in the BST nodes. It's inherited by the Node class to store specific entries.

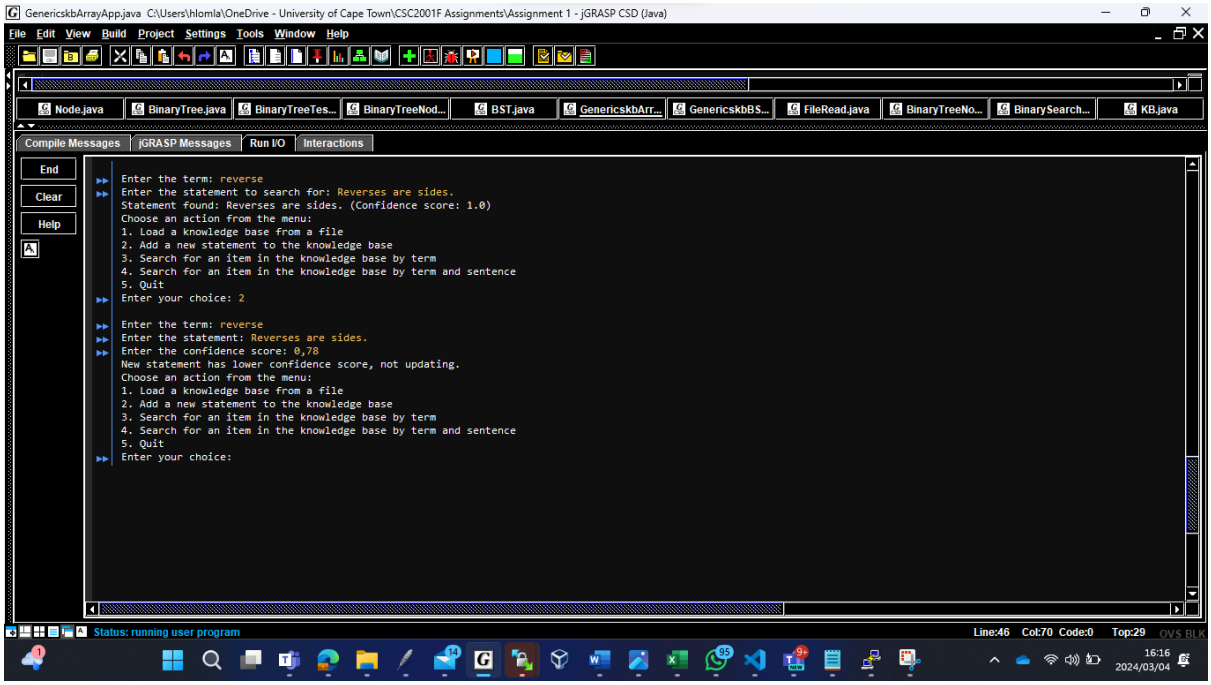
The BST class creates, manipulates, and maintains the BST data structure. Nodes are the elements of the BST that hold knowledge base entries. Knowledge base entries are represented by instances of the KB class and stored within the nodes. The BST class interacts with nodes to perform operations like searching, adding, updating, and deleting entries. Nodes interact with the KB class to store and retrieve knowledge base entries.

Test values you used during testing and what the output was in each case






GenericskbArrayApp.java C:\Users\hlomla\OneDrive - University of Cape Town\CSC2001F Assignments\Assignment 1 - jGRASP CSD (Java)
File Edit View Build Project Settings Tools Window Help
Node.java BinaryTree.java BinaryTreeTes... BinaryTreeNod... BST.java GenericskbArr... GenericskbBS... FileRead.java BinaryTreeNo... BinarySearch... KB.java
Compile Messages jGRASP Messages Run I/O Interactions
End
Clear
Help
----jGRASP exec: java GenericskbArrayApp
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 1
Enter file name: GenericsKB.txt
Knowledge base loaded successfully.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 3
Enter the term to search: reverse
Statement found: Reverses are sides. (Confidence score: 1.0)
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 4
Enter the term: reverse
Enter the statement to search for: Reverses are sides.
Statement found: Reverses are sides. (Confidence score: 1.0)
Status: running user program
Line:46 Col:70 Code:0 Top:29
16:15
2024/03/04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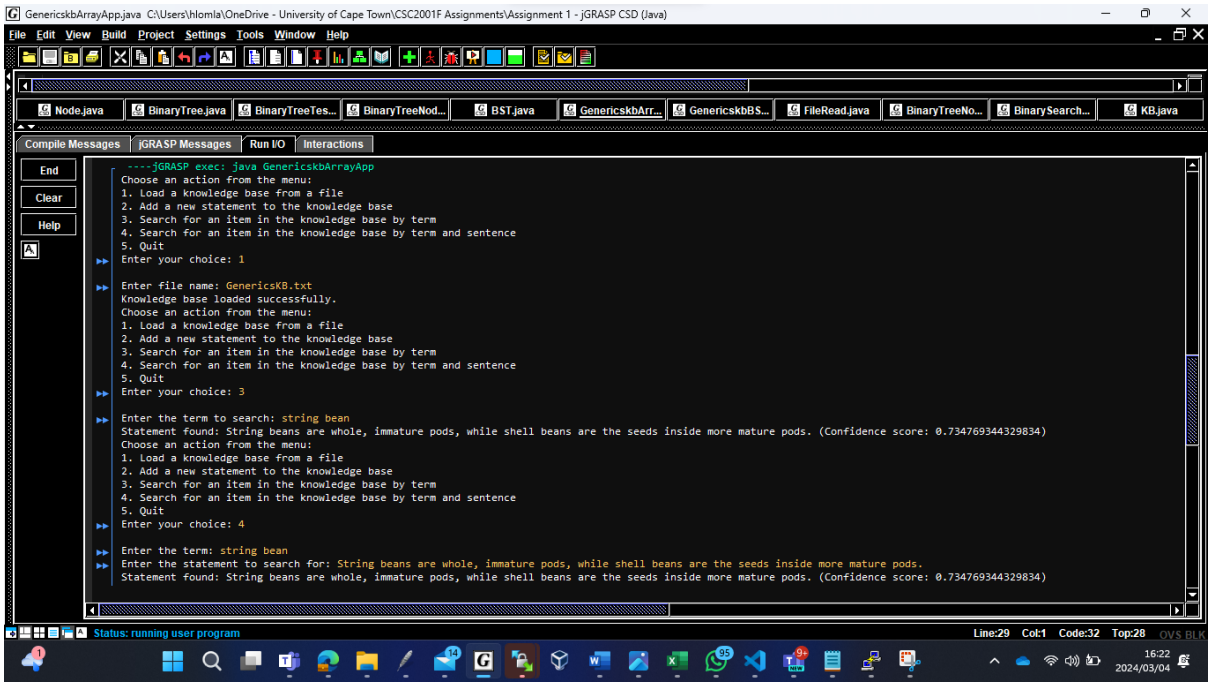
Node.java BinaryTree.java BinaryTreeTes... BinaryTreeNod... BST.java GenericskbArr... GenericskbBS... FileRead.java BinaryTreeNo... BinarySearch... KB.java
Compile Messages jGRASP Messages Run I/O Interactions
End
Clear
Help
Enter the term: reverse
Enter the statement to search for: Reverses are sides.
Statement found: Reverses are sides. (Confidence score: 1.0)
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 2
Enter the term: reverse
Enter the statement: Reverses are sides.
Enter the confidence score: 0,78
New statement has lower confidence score, not updating.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice:
Status: running user program
Line:46 Col:70 Code:0 Top:29
16:16
2024/03/04


GenericskbArrayApp.java C:\Users\hlomla\OneDrive - University of Cape Town\CSC2001F Assignments\Assignment 1 - jGRASP CSD (Java)
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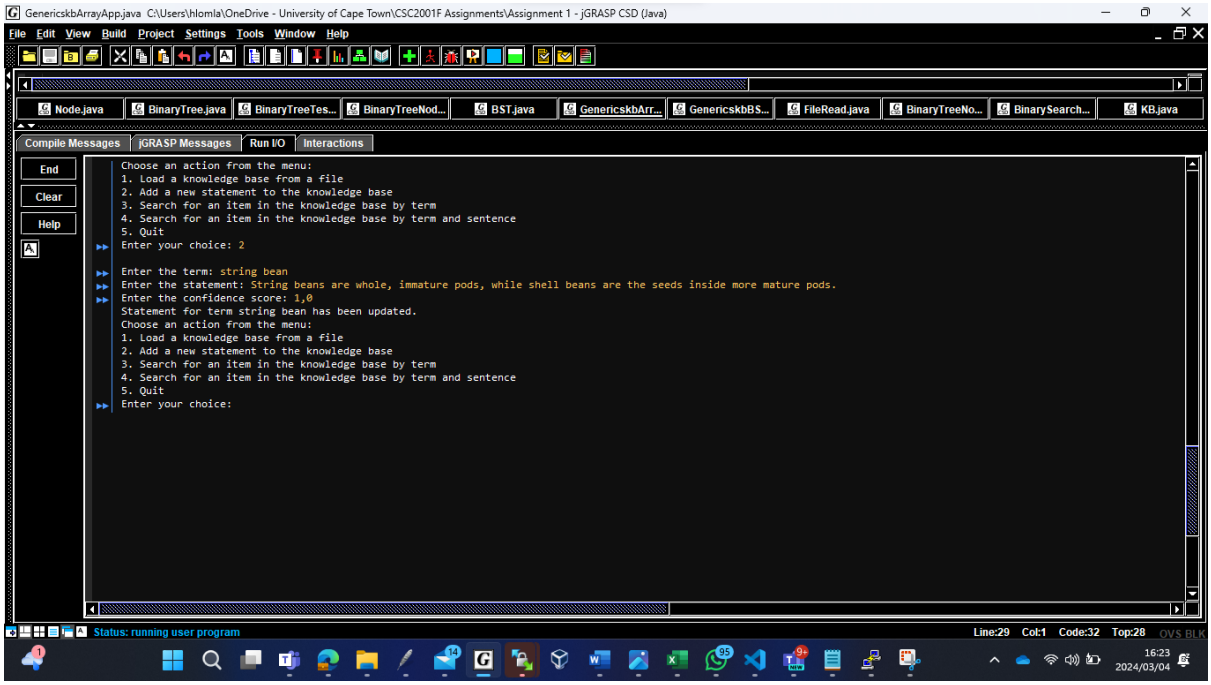
End
Clear
Help
----jGRASP exec: java GenericskbArrayApp
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 1
Enter file name: GenericsKB.txt
Knowledge base loaded successfully.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 3
Enter the term to search: string bean
Statement found: String beans are whole, immature pods, while shell beans are the seeds inside more mature pods. (Confidence score: 0.734769344329834)
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 4
Enter the term: string bean
Enter the statement to search for: String beans are whole, immature pods, while shell beans are the seeds inside more mature pods.
Statement found: String beans are whole, immature pods, while shell beans are the seeds inside more mature pods. (Confidence score: 0.734769344329834)
Status: running user program
Line:29 Col:1 Code:32 Top:28
16:22
2024/03/04


GenericskbArrayApp.java C:\Users\hlomla\OneDrive - University of Cape Town\CSC2001F Assignments\Assignment 1 - jGRASP CSD (Java)
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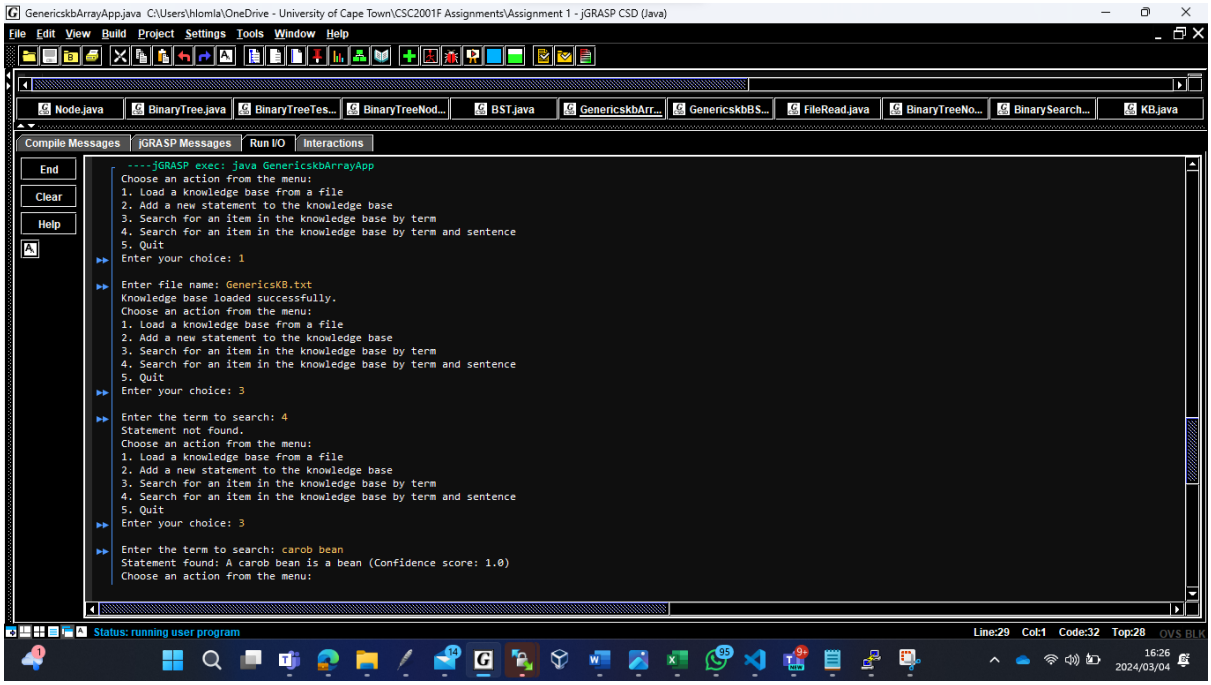
Compile Messages jGRASP Messages Run I/O Interactions
End
Clear
Help
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 2
Enter the term: string bean
Enter the statement: String beans are whole, immature pods, while shell beans are the seeds inside more mature pods.
Enter the confidence score: 1.0
Statement for term string bean has been updated.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice:
Status: running user program
Line:29 Col:1 Code:32 Top:28
16:23
2024/03/04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Compile Messages jGRASP Messages Run I/O Interactions
End
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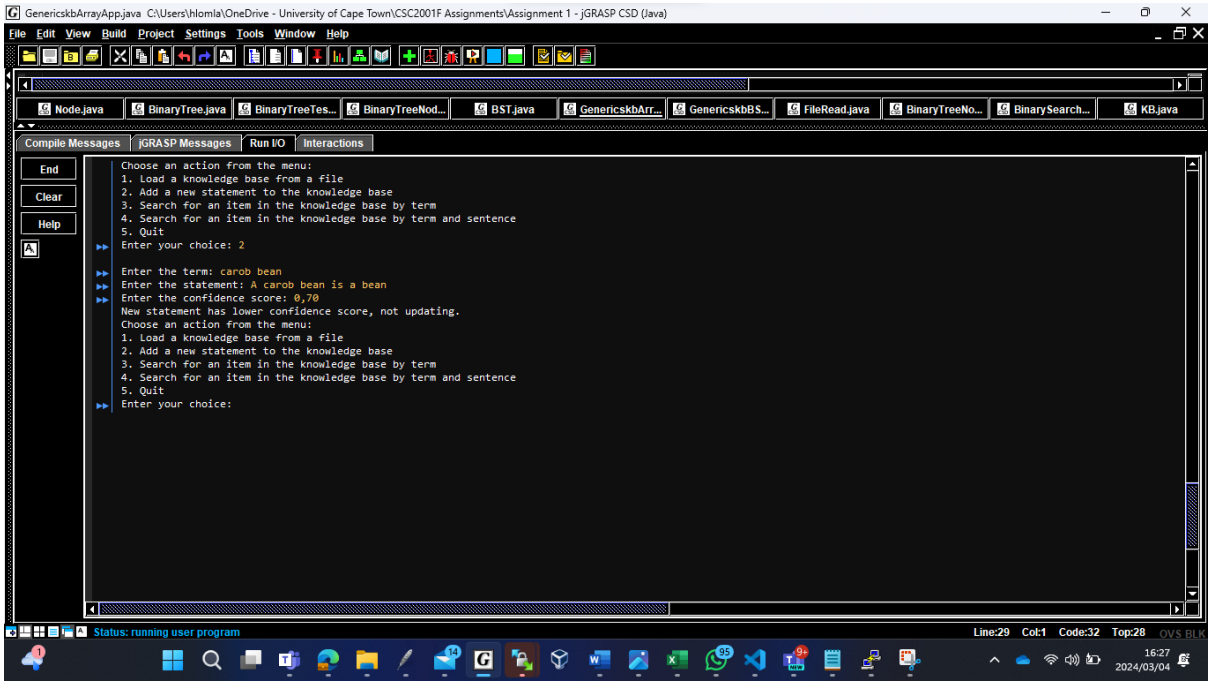
Help
----jGRASP exec: java GenericskbArrayApp
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 1
Enter file name: GenericsKB.txt
Knowledge base loaded successfully.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 3
Enter the term to search: 4
Statement not found.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 3
Enter the term to search: carob bean
Statement found: A carob bean is a bean (Confidence score: 1.0)
Choose an action from the menu:
Status: running user program
Line:29 Col:1 Code:32 Top:28
16:26
2024/03/04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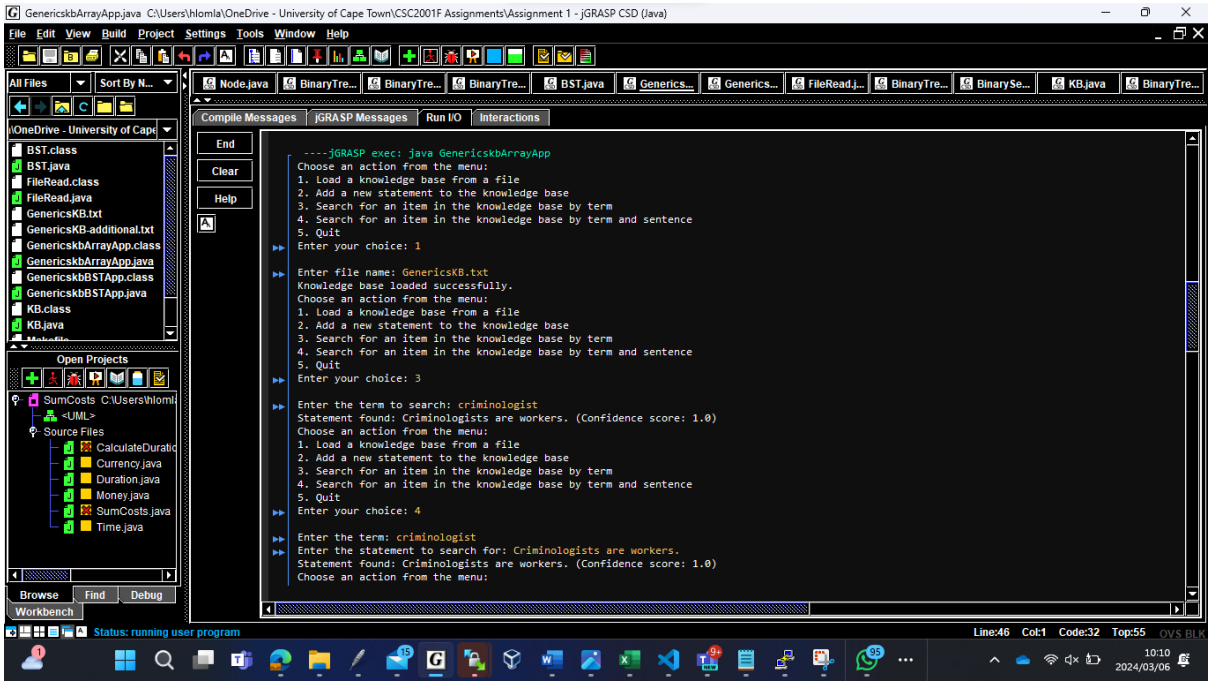
Compile Messages jGRASP Messages Run I/O Interactions
End
Clear
Help
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 2
Enter the term: carob bean
Enter the statement: A carob bean is a bean
Enter the confidence score: 0,70
New statement has lower confidence score, not updating.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice:
Status: running user program
Line:29 Col:1 Code:32 Top:28
16:27
2024/03/04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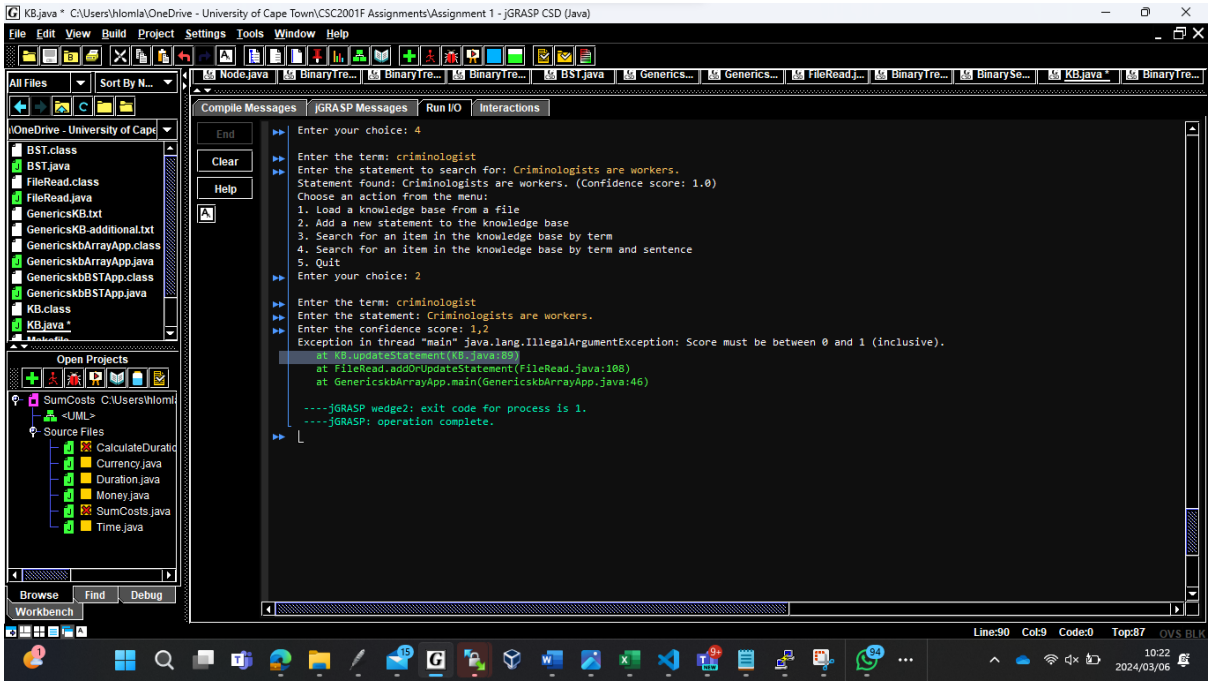
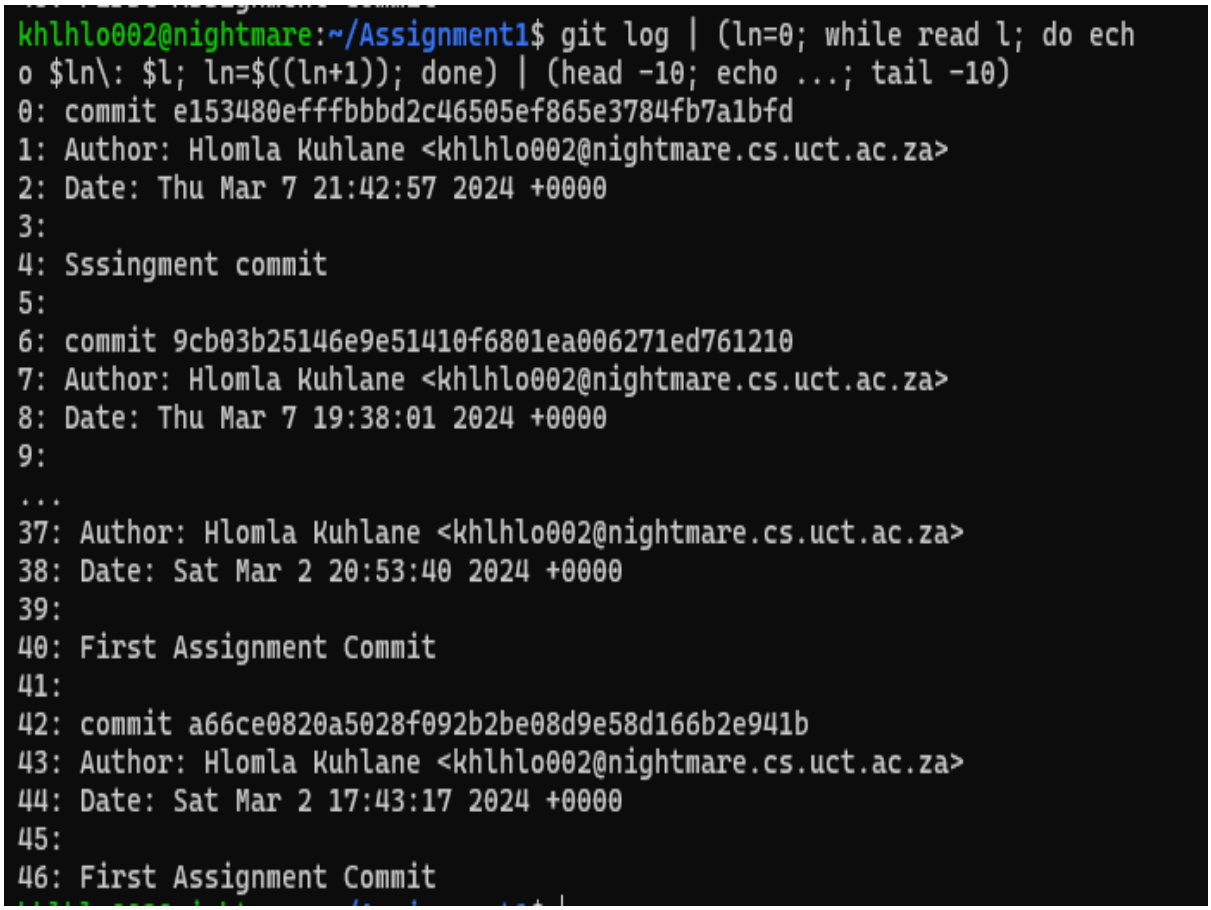
Node.java BinaryTre... BinaryTre... BinaryTre... BST.java Generics... Generics... FileRead.j... BinaryTre... BinarySe... KB.java BinaryTre...
Compile Messages jGRASP Messages Run I/O Interactions
End
Clear
Help
----jGRASP exec: java GenericskbArrayApp
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 1
Enter file name: GenericsKB.txt
Knowledge base loaded successfully.
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 3
Enter the term to search: criminologist
Statement found: Criminologists are workers. (Confidence score: 1.0)
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 4
Enter the term: criminologist
Enter the statement to search for: Criminologists are workers.
Statement found: Criminologists are workers. (Confidence score: 1.0)
Choose an action from the menu:
BST.class
BST.java
FileRead.class
FileRead.java
GenericsKB.txt
GenericsKB-additional.txt
GenericskbArrayApp.class
GenericskbArrayApp.java
GenericskbBSTApp.class
GenericskbBSTApp.java
KB.class
KB.java
Open Projects
SumCosts C:\Users\hlomla
<UML>
Source Files
CalculateDuratio
Currency.java
Duration.java
Money.java
SumCosts.java
Time.java
Browse Find Debug
Workbench
Status: running user program
Line:46 Col:1 Code:32 Top:55
10:10
2024/03/06


KB.java * C:\Users\hlomla\OneDrive - University of Cape Town\CSC2001F Assignments\Assignment 1 - jGRASP CSD (Java)
File Edit View Build Project Settings Tools Window Help
Node.java BinaryTre... BinaryTre... BinaryTre... BST.java Generics... Generics... FileRead.j... BinaryTre... BinarySe... KB.java * BinaryTre...
Compile Messages jGRASP Messages Run I/O Interactions
End
Clear
Help
Enter your choice: 4
Enter the term: criminologist
Enter the statement to search for: Criminologists are workers.
Statement found: Criminologists are workers. (Confidence score: 1.0)
Choose an action from the menu:
1. Load a knowledge base from a file
2. Add a new statement to the knowledge base
3. Search for an item in the knowledge base by term
4. Search for an item in the knowledge base by term and sentence
5. Quit
Enter your choice: 2
Enter the term: criminologist
Enter the statement: Criminologists are workers.
Enter the confidence score: 1,2
Exception in thread "main" java.lang.IllegalArgumentException: Score must be between 0 and 1 (inclusive).
at KB.updateStatement(KB.java:89)
at FileRead.addOrUpdateStatement(FileRead.java:108)
at GenericskbArrayApp.main(GenericskbArrayApp.java:46)
----jGRASP wedge2: exit code for process is 1.
----jGRASP: operation complete.
BST.class
BST.java
FileRead.class
FileRead.java
GenericsKB.txt
GenericsKB-additional.txt
GenericskbArrayApp.class
GenericskbArrayApp.java
GenericskbBSTApp.class
GenericskbBSTApp.java
KB.class
KB.java *
Open Projects
SumCosts C:\Users\hlomla
<UML>
Source Files
CalculateDuratio
Currency.java
Duration.java
Money.java
SumCosts.java
Time.java
Browse Find Debug
Workbench
Line:90 Col:9 Code:0 Top:87
10:22
2024/03/06

CREATIVITY

Creativity is evident in the text-based user interface, problem-solving, error handling, code structure, and extensibility of the program. The intuitive menu layout and options presentation make the application easy to use. Creativity is also evident in the program's ability to load data from a file, add new statements, and search efficiently. Creativity in coding involves writing clean, readable, and maintainable code. Creativity also involves designing systems that can be extended for future enhancements.

GIT USAGE


khlhlo002@nightmare:~/Assignment1$ git log | (ln=0; while read l; do ech
o $ln\: $l; ln=$((ln+1)); done) | (head -10; echo ...; tail -10)
0: commit e153480efffbbbd2c46505ef865e3784fb7a1bfd
1: Author: Hlomla Kuhlane <khlhlo002@nightmare.cs.uct.ac.za>
2: Date: Thu Mar 7 21:42:57 2024 +0000
3:
4: Sssingment commit
5:
6: commit 9cb03b25146e9e51410f6801ea006271ed761210
7: Author: Hlomla Kuhlane <khlhlo002@nightmare.cs.uct.ac.za>
8: Date: Thu Mar 7 19:38:01 2024 +0000
9:
...
37: Author: Hlomla Kuhlane <khlhlo002@nightmare.cs.uct.ac.za>
38: Date: Sat Mar 2 20:53:40 2024 +0000
39:
40: First Assignment Commit
41:
42: commit a66ce0820a5028f092b2be08d9e58d166b2e941b
43: Author: Hlomla Kuhlane <khlhlo002@nightmare.cs.uct.ac.za>
44: Date: Sat Mar 2 17:43:17 2024 +0000
45:
46: First Assignment Commit