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DATA STRUCTURES

PROJECT II
SEARCH ENGINE

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- The Osama_Mudar_ListNode class represents a node in a linked list. It is a generic class.
- denoted by the "M" parameter. allowing it to store data of any type. Each node contains
- a piece of data of type M and a reference to the next node in the list.
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- Attributes:
- data: The data stored in the node. of type M.
- next: A reference to the next node in the linked list.
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- Methods:
- public Osama_Mudar_ListNode(M data): Constructor that initializes a new ListNode with
- the given data and sets the next node reference to null.
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- This class is typically used as part of a linked list data structure. where each node
- holds a value and a reference to the next node in the sequence.

- The Osama_Mudar_TreeNode class represents a node in a binary tree data structure. Each node
- contains a piece of data (Data) of type String. references to the left and right child nodes
- (left and right). and a linked list of file counters (counters).
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- Attributes:
- Data: The data stored in the node. typically representing a string value.
- left: A reference to the left child node in the binary tree.
- right: A reference to the right child node in the binary tree.
- counters: A linked list of file counters. represented by instances of Osama_Mudar_FileCounter.
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- Methods:
- public Osama_Mudar_TreeNode(): Default constructor that initializes a new TreeNode with
- default values (null for data and child node references. an empty linked list for counters).
- public Osama_Mudar_TreeNode(String value): Constructor that initializes a new TreeNode with
- the given string value as data. and sets child node references to null and an empty linked
- list for counters.
- void printCounters(): Method to print the file counters stored in the node's counters linked list.
- It formats the output as (fileName : counter. fileName : counter. ...).
- String getCounters(): Method to get a string representation of the file counters stored in the node's
- counters linked list. It returns a formatted string as (fileName : counter. fileName : counter. ...).
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- This class is used in binary tree structures. where each node has at most two children (left and right)
- and can store additional data and metadata. such as file counters in this case.

The Osama_Mudar_BinarySearchTree class represents a binary search tree (BST) data structure, which is a binary tree where the left subtree of a node contains only nodes with values less than the node's value, and the right subtree contains only nodes with values greater than the node's value. Here's a detailed explanation of the class and its methods:

1. Attributes:
   - DefaultListModel<String> modell: A model used for storing elements to be displayed in a graphical user interface (GUI).
   - Osama_Mudar_TreeNode root: The root node of the binary search tree.
2. Methods:
   - void insert(String value): Inserts a new node with the given value into the BST.
   - Osama_Mudar_TreeNode get(String key): Retrieves the node with the specified key value from the BST, if it exists.
   - boolean contains(String value): Checks if the BST contains a node with the specified value.
   - void printTreeInOrder(DefaultListModel mo): Performs an in-order traversal of the BST and adds elements to the specified model (mo).
   - void printTreePreOrder(DefaultListModel mo): Performs a pre-order traversal of the BST and adds elements to the specified model (mo).
   - void printTreePostOrder(DefaultListModel mo): Performs a post-order traversal of the BST and adds elements to the specified model (mo).
3. Insertion:
   - The insert(String value) method inserts a new node with the given value into the BST. It compares the value with nodes in the tree to determine the appropriate position for insertion.
4. Retrieval:
   - The get(String key) method retrieves the node with the specified key value from the BST using a recursive approach. It returns the node if found, otherwise null.
5. Containment Check:
   - The contains(String value) method checks if the BST contains a node with the specified value using a recursive approach. It returns true if the value is found, otherwise false.
6. Traversal and Display:
   - The printTreeInOrder(DefaultListModel mo), printTreePreOrder(DefaultListModel mo), and printTreePostOrder(DefaultListModel mo) methods perform in-order, pre-order, and post-order traversals of the BST, respectively. They add elements to the provided model (mo) to display the tree in the specified traversal order.

The Osama_Mudar_FileCounter class represents a file counter object used in managing and tracking file occurrences. Below is a detailed explanation of its components and functionality:

1. Attributes:
   - String fileName: Represents the name of the file associated with the counter.
   - int counter: Represents the count of occurrences of the file.
2. Constructor:
   - public Osama_Mudar_FileCounter(String fileName): Initializes a new Osama_Mudar_FileCounter object with the specified file name and sets the counter to 1 by default.
3. Static Methods:
   - public static boolean fileExist(String value, Osama_Mudar_LinkedList<Osama_Mudar_FileCounter> list): Checks if a file with the specified name exists in the provided linked list of file counters. It iterates through the list and returns true if the file name matches any existing counter's file name, indicating the file exists.
   - public static Osama_Mudar_FileCounter getFileCounter(String value, Osama_Mudar_LinkedList<Osama_Mudar_FileCounter> list): Retrieves the Osama_Mudar_FileCounter object associated with the specified file name from the provided linked list of file counters. If the file name is found in the list, it returns the corresponding Osama_Mudar_FileCounter object; otherwise, it prints a message indicating that the file name doesn't exist in the list and returns null.

These methods are useful for managing file counters, checking file existence, and retrieving file counters based on file names from a linked list of Osama_Mudar_FileCounter objects.