**GIT Department of Computer Engineering**

**CSE 222/505 - Spring 2020**

**Homework 5 Report**

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**Q1**

**Class Diagram:**

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**Problem solutions approach:**

In this question the problem was to find a way to organize a file system and the best way was to organize it using a tree where the outer directory ( folder ) is the parent node and the files are the leaves of the tree and each node has a type which identifies it as being a directory or a file and each node has an array list to store all of its children and a node to link it to its parent.

The system also enables the user to modify the system by adding and removing a node provided it doesn’t exist in the same path when adding and it exists in the path when removing

The system also warns the user when attempting to remove a non-empty directory by listing all the contents of that directory and asking for confirmation.

**Test cases:**

|  |  |  |
| --- | --- | --- |
| Test Scenario | Test Case | Result |
| Adding a new node | Node doesn’t exist in the path | Adds a new node |
| Node already exists in the path | Doesn’t add a node and gives a warning |
| Add a node after a file |
| Removing a node | Node exists in the path and doesn’t have children | Deletes node |
| Node doesn’t exist in the path | Throws NoSuchElement Exception |
| Node exists in the path but has children | Lists Children and asks for confirmation |
| Search for nodes with given key | Node with given key exists in the tree | Prints the node type and its path |
| Node doesn’t exist in the tree | Returns |
| Print the tree | Print the tree | Prints the tree |

**Running commands and results:**

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**Q2**

**Class Diagram:**

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**Problem solutions approach:**

The problem was to create an expression tree that can handle both prefix and postfix expressions and to do that we used a binary tree such that every operator is a node that has two children nodes and these children are leaves if they are operands or branches if they are operators

**Test cases:**

|  |  |  |
| --- | --- | --- |
| Test Scenario | Test case | Result |
| Adding nodes | Postfix expression | Expression is divided and each piece is added as a node |
| Prefix expression | Expression is reversed the added to the tree |
| Evaluating an expression | Evaluating an expression | Returns the result as an integer |
| Printing the tree | Preorder traverse | Traverses the tree in preorder manner and prints the nodes |
| Post order traverse | Traverses the tree in post order manner and prints the nodes |

**Running commands and results:**

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**Q3**

**Class diagram:**

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**Problem solutions approach:**

In this question we used a binary search tree to group people with different ages the tree allows us to sort them find an age group in a short time and compare age groups

**Test Cases:**

|  |  |  |
| --- | --- | --- |
| Test Scenario | Test Case | Result |
| Adding an age group | age group doesn’t exist | Adds a new node with that age group in the appropriate place in the tree and sets the number of people to 1 |
| Age group already exists | Finds the node of that age group in the tree and increase the number of people by 1 |
| Removing an age group | age group doesn’t exist | Throws a NoSuchElement exception |
| Age group has more than 1 person | Decreases number of people in that age group by 1 |
| Age group has 1 person | Deletes the node |
| Finding an age group | age group doesn’t exist | Throws a NoSuchElement exception |
| age group exists | Returns the age groups data |
| Printing an age group | Printing an age group | Prints the age and number of people |

**Running commands and results:**

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