===Lab Info===

*100 points

* Due 11:59pm on Sunday 10/4 for Monday lab and Tuesday 10/6 Wednesday Lab

==Assignment==

In this assignment you will work on designing a class for a binary search tree. You are to read in the numbers from a data file of integers, one at a time, and insert each number, as it is read, into a binary search tree (for building the BST). The file of numbers you read from will be data.txt. You may hard code the file name in your program if you wish.

For level order traversal, you need a queue. "'Don't forget that you cannot use STL.'" An algorithm for level order traversal is as follows:

1- put the address of the root in the queue (if root is NULL, empty tree, algorithm finished)

2- while the queue is not empty

3- remove an address from the queue

4- print out the data that the address is refereeing to

5- put the address of its left and then right children in the queue (if they are not NULL)

6- end while

In this lab, first you should make the tree by the samples which are in the data.txt, after that your program should have a simple menu like:

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

By inserting the appropriate number or typing the command (specify it), the command should be applied to the tree. The commands insert and remove will also need a number to be inserted or removed. Don’t forget that duplicates are allowed

===BST===

The BST should implement an appropriate constructor and destructor. The rest of the methods should be implemented as follows:

* insert(x) should insert x in the BST.

* remove(x) should delete x from the BST. For consistency when removing a data that has two children, use the smallest data in the right subtree of the data that should be removed in order to replace the removed data. If you have to remove 5 and there are several 5 in the tree, remove all of them.

* search(x) should find x in the BST and return a pointer to it, NULL if not found.

* deletemin() should delete the smallest value from the BST.

* deletemax() should delete the largest value from the BST.

* preorder() should print out all the elements of the BST using preorder traversal.

* inorder() should print out all the elements of the BST using inorder traversal. (sort)

* levelorder() should print out all the elements of the BST using levelorder traversal.

===Output===

data.txt elements : 7 3 1 6 8 13 9 10 15

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

> 3

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

> 4

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

> 2

Which number do you like to remove from the tree?

>7

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>5

preorder: 8 3 6 13 9 10

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>1

Please insert the number that you want to be inserted in the tree

> 2

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>1

Please insert the number that you want to be inserted in the tree

> 13

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>1

Please insert the number that you want to be inserted in the tree

> 11

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>1

Please insert the number that you want to be inserted in the tree

> 12

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>1

Please insert the number that you want to be inserted in the tree

> 13

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>5

preorder: 8 3 2 6 13 9 10 11 12 13 13 13

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>2

Which number do you like to remove from the tree?

>6

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>2

Which number do you like to remove from the tree?

>10

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>2

Which number do you like to remove from the tree?

>13

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>2

Which number do you like to remove from the tree?

>20

20 is not in the tree

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>5

preorder: 8 3 2 9 11 12

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>6

inorder: 2 3 8 9 11 12

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>7

levelorder:

8 3 9 2 11 12

.....

Please choose one of the following commands:

1- insert

2- remove

3- deletemin

4- deletemax

5- preorder

6- inorder

7- levelorder

8- exit

>8

===Files===

* Files to include in folder:

** all source files

** a functioning <tt>makefile</tt>

** <tt>data.txt</tt>

* Folder name: <tt>Lastname_Lab5</tt>

* Compressed file name: <tt>Lastname_Lab5.zip</tt> (or <tt>.rar</tt> or <tt>.tar.gz</tt>)

* Executable name: <tt>lab5</tt>