

## **CS271 Homework 4**

**Posted Online:** Tuesday 2007.03.15

**Due Date/Time:** Tuesday 2007.03.29 at Midnight

**Description:** Complete a C++ program that implements a Binary Search Tree

**Files to Submit:** Makefile, main.cpp, treenode.h, binarysearchtree.h, binarysearchtree.cpp

**Purpose:** To understand and implement a Binary Search Tree

**Knowledge Needed:** Binary Search Trees, Inserts, Pre In and Post Order Traversals

**Homework Details:** This is a simple version of a Binary Search tree. You will start from scratch, thus having to create your own Makefile, cpp, and .h files ... although you are more than welcome to utilize the files from your previous homework assignments to start with.

You will create a binary search tree node that has 3 parts .. put it into treenode.h

1. Data (is just an integer)
2. Left subtree (pointer to the left subtree, to another tree node)
3. Right subtree (pointer to the right subtree, to another tree node)

You will create a binary search tree that has 1 data member

1. root (a tree node pointer)

and 8 public functions (you can have private member functions as helpers)

1. Default Constructor (create an empty tree ... root = NULL)
2. Destructor (destroy the nodes in the tree with a Post Order traversal)
3. Insert (add an integer to the binary search tree)
4. PreOrder traversal
5. In Order traversal
6. Post Order traversal
7. Min Number in tree (just traverse left as far as you can)
8. Max Number in tree (just traverse right as far as you can)

Again ... **bold** ... is the user input

~> **./binarysearchtree**

-----  
Homework 4 MAIN MENU  
-----

- 1 – Insert integer into Tree
- 2 – PreOrder traversal
- 3 – In Order traversal
- 4 – Post Order traversal
- 5 – Max Number in Tree
- 6 – Min Number in Tree
- X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **1**  
Input Number: **6**  
-----

Homework 4 MAIN MENU  
-----

- 1 – Insert integer into Tree
- 2 – PreOrder traversal
- 3 – In Order traversal
- 4 – Post Order traversal
- 5 – Max Number in Tree
- 6 – Min Number in Tree
- X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **1**  
Input Number: **4**  
-----

Homework 4 MAIN MENU  
-----

- 1 – Insert integer into Tree
- 2 – PreOrder traversal
- 3 – In Order traversal
- 4 – Post Order traversal
- 5 – Max Number in Tree
- 6 – Min Number in Tree
- X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **1**  
Input Number: **7**  
-----

Homework 4 MAIN MENU  
-----

- 1 – Insert integer into Tree
- 2 – PreOrder traversal
- 3 – In Order traversal
- 4 – Post Order traversal

5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **1**  
Input Number: **8**

-----  
Homework 4 MAIN MENU

-----  
1 – Insert integer into Tree  
2 – PreOrder traversal  
3 – In Order traversal  
4 – Post Order traversal  
5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **1**  
Input Number: **3**

-----  
Homework 4 MAIN MENU

-----  
1 – Insert integer into Tree  
2 – PreOrder traversal  
3 – In Order traversal  
4 – Post Order traversal  
5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **1**  
Input Number: **5**

-----  
Homework 4 MAIN MENU

-----  
1 – Insert integer into Tree  
2 – PreOrder traversal  
3 – In Order traversal  
4 – Post Order traversal  
5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **2**  
Pre Order Traversal : 6 4 3 5 7 8

-----  
Homework 4 MAIN MENU

-----  
1 – Insert integer into Tree

2 – PreOrder traversal  
3 – In Order traversal  
4 – Post Order traversal  
5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **3**  
In Order Traversal : 3 4 5 6 7 8

-----  
Homework 4 MAIN MENU

-----  
1 – Insert integer into Tree  
2 – PreOrder traversal  
3 – In Order traversal  
4 – Post Order traversal  
5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **4**  
Post Order Traversal : 3 5 4 8 7 6

-----  
Homework 4 MAIN MENU

-----  
1 – Insert integer into Tree  
2 – PreOrder traversal  
3 – In Order traversal  
4 – Post Order traversal  
5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **5**  
Max Number : 8

-----  
Homework 4 MAIN MENU

-----  
1 – Insert integer into Tree  
2 – PreOrder traversal  
3 – In Order traversal  
4 – Post Order traversal  
5 – Max Number in Tree  
6 – Min Number in Tree  
X - EXIT PROGRAM

-----  
Choose an Option (hit enter): **6**  
Min Number = 3

Homework 4 MAIN MENU

- 
- 1 – Insert integer into Tree
  - 2 – PreOrder traversal
  - 3 – In Order traversal
  - 4 – Post Order traversal
  - 5 – Max Number in Tree
  - 6 – Min Number in Tree
  - X - EXIT PROGRAM

-----

Choose an Option (hit enter): **X**