**ASSIGNMENT4: BINARY SEARCH TREE ON HARDDISK**

**DUE DATE: 11:59 PM, 9th April (Thursday Night)**

**Problem statement**:

Implement a binary search tree on a harddisk.

Your tree should support the following operations (mentioned in the header file)

1. insert

2. delete based on the key

3. traversal - inorder : space separated values followed by \n

4. traversal - pre-order : space separated values followed by \n

As you guys know that we can’t just store pointers directly in a file; they’d have no meaning even if you do write them. When it comes to a file, we represent addresses of things with file offsets. So, data structures like linked lists or trees will use offsets instead of pointers.

You may realize by now that you can’t just always have root at offset 0. I may call delete function which would invalidate that node and now your new root will be at some other offset.

Note that deletion of nodes creates holes in your file. You need to keep track of these invalidated nodes so that you can reuse the space without unnecessarily increasing the size of the file.

So, the first structure in the file will be the header indicating the offset to the root node and offset to the linked list of free nodes.

After the header, you can have your normal tree node with a data item, a left offset and a right offset. A value of -1 for offset can be used to indicate NULL. To make a list with these nodes, just use either the left or the right offset to point to the offset of the next node.

In case of duplicate keys, just return from insert function. No need to add it again.

The header file is present in the drive folder. Do not modify the header file.

We will close and restart the program to check whether the consistency is maintained and whether you’re storing the tree properly on the file or not.

**Please note that you’re not writing plaintext data to a file. This assignment is all about writing arbitrary binary data to a file.**

Files to be submitted:

For this assignment you need to submit two files: implementation and readme.

A4\_<SRN>.c

A4\_README\_<SRN>.txt : Should contain the following:

* Key takeaway from this assignment.
* Additional notes

You can ask doubts at: [Doubts clarifications](https://docs.google.com/spreadsheets/d/1uepZktwcFP_s7xYlLxu8ZcKKgQaT9qeLUtdkfz1EzdA/edit?usp=sharing) (Use the assignment 4 sheet to ask your queries)

Submission link: <https://forms.gle/JLtiAbUJK1QiTrm56>

**DO NOT COPY/SHARE CODE. Do not take code from your peers or seniors.**