**Pseudocode**

**START** program

**SET** integer *choice* = 0

**CREATE** a BinarySearchTree object named *bst*

**CREATE** Bid object named *bid*

**CREATE** time\_t *ticks*

**WHILE** *choice* not equal to 9

**OUTPUT** menu options

**INPUT** *choice*

**IF***choice* equals 1

**INVOKE** loadBids() function, sending csvPath, and a pointer to *bst* as arguments

**ELSE IF** choice equals 2

**INVOKE** inOrder() function on *bst*

**ELSE IF** choice equals 3

**SET** *ticks* to current system time

**SET** *bid* equal to the value of the Search() function sending in *bidkey* on *bst*

**SET** *ticks* to current system time - current ticks value

**IF bid’s bidId is not empty**

**INVOKE** displayBid() function on *bid*

**ELSE**

**OUTPUT** “Bid Id “ + bidkey + “ not found.”

**OUTPUT** “time: “ + *ticks* + “ clock ticks”

**OUTPUT** “time: “ + *ticks* \* 1.0 / CLOCKS\_PER\_SEC + “seconds”

**ELSE IF** *choice* equals 4

**INVOKE** Remove() function sending *bidkey* on *bst*

**ELSE IF** *choice* equals 9

**EXIT** loop

**ELSE**

**CONTINUE** loop

**OUTPUT** “Good bye”

**END** program

**Reflection**

The binary search tree structure is a very useful tool to know. It can sort data in a way that allows for a very time-efficient process. It runs through that data using a greater, less than, or equal to algorithm. This process essentially in a perfect tree cuts the number of unsearched nodes in half with each iteration but cuts out nodes that logically cannot be correct. This can be used for searching for a node or removing the data in a node from the tree.

While creating a binary search tree removing nodes became a problem. Though I got the code running after trying to remove my node, the program can still find that node in the tree. In order to test this I would load the bids, and search for the bid to prove that it excites. Then I would remove it and try to search again. This was able to show it was not working properly.

Vahid, F. (2019). CS300: Data Structure and Algorithms. ZyBooks. Retrieved July 2, 2023 from <https://learn.zybooks.com/zybook/CS-300-X6110-OL-TRAD-UG.23EW6>