



Bachelor of IT (Computer Science)
Assignment 2
CAB301 - Algorithms and Complexity

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1 NoDVDs Method

1.1 Algorithm Design

This method calculates the total number of DVDs in a MovieCollection through a in-order node tree traversal using a stack of movies. First, it initializes the DVD count to be 0 and starts traversing from the root. The outer while loop continues until the current movie is null and the stack count is 0. The inner while loop traverses the left subtree, pushing left child movies onto the stack. After traversing the left subtree, the method pops the top movie, adds its total copies to the running total, and moves to its right child of that movie. This process visits each node, cumulatively adding the total copies to the count. Once the traversal finishes, it returns the total DVDs.

ALGORITHM *NoDVDs()*

```
// Calculates the total number of DVDs
// Returns the total number of DVDs in the MovieCollection
totalDVDs  $\leftarrow$  0
stack  $\leftarrow$  an empty BTreeNodes stack
curr  $\leftarrow$  root node of the MovieCollection
while curr  $\neq$  null or stack is not empty
    while curr  $\neq$  null
        stack.push(curr)
        curr  $\leftarrow$  curr.LChild
    curr  $\leftarrow$  stack.pop()
    totalDVDs  $\leftarrow$  totalDVDs + curr.Movie.TotalCopies
    curr  $\leftarrow$  curr.RChild
return totalDVDs
```

1.2 Algorithm Analysis