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 BTreeNodes. Firstly, it initializes the DVD count to be 0, creates an empty stack of BTreeNodes and starts traversing from the root. Next, an outer while loop starts and continues until the current BTreeNode is null and the stack count is equal to 0. Inside the outer while loop, the inner while loop traverses the left subtree, pushing left child BTreeNodes onto the stack. After traversing the left subtree, the method pops the first movie from the top of the stack, adds its total copies to the running total, and moves to the right child of the popped 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 ← 0
  stack ← an empty BTreeNodes stack
  curr ← root node of the MovieCollection
  while *curr* ≠ null **or** *stack* **is not** empty
      while *curr* ≠ null
         stack.push(curr)
         curr ← *curr.LChild*
      curr ← *stack.pop()*
      totalDVDs ← *totalDVDs* + *curr.Movie.TotalCopies*
      curr ← *curr.RChild*
  return *totalDVDs*

1.2 Algorithm Analysis