

Answer on Question # 44894, Programming, Other

Task:

1. Describe a recursive algorithm for finding the maximum element in an array A of n elements. What is the running time of your algorithm?

Answer:

Algorithm Max (A, m, n)

```
if A[n-1]>m
    m ← A[n-1]
if n=1
    return m
else
    return Max(A, m, n-1)
```

Task:

2. Draw the recursion trace for the execution of ReverseArray(data, 0, 4), on the array data = 4, 3, 6, 2, 6.

Answer:

Algorithm ReverseArray(A, i, j):

Input: An array A and nonnegative integer indices i and j

Output: The reversal of the elements in A starting at index i and ending at j

```
if i < j then
```

Swap A[i] and A[j]

ReverseArray(A, i+1, j-1)

```
return
```

1) i=0, j=4, A= {4, 3, 6, 2, 6}

i<j → 0<4 (yes)

swap(A[0], A[4])

A= {6, 3, 6, 2, 4}

2) i=1, j=3, A= {6, 3, 6, 2, 4}

i<j → 1<3 (yes)

swap(A[1], A[3])

A= {6, 2, 6, 3, 4}

3) i=2, j=2, A= {6, 2, 6, 3, 4}

i<j → 2<2 (no)

```
return
```

Task:

3. Give an algorithm for finding the second-to-last node in a singly-linked list which the last node is indicated by a null next reference.

Answer:

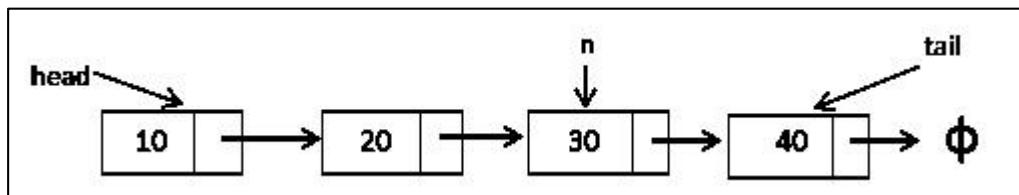
Algorithm findPenultimate(S):

Node n \leftarrow head

while (n.getNext() != tail) do

 N \leftarrow n.getNext()

return n



Task:

4. Suppose we are maintaining a collection C of elements such that, each time we add a new element to the collection, we copy the contents of C into a new array list of just the right size. What is the running time of adding n elements to an initially empty collection C in this case?

Answer:

The total running time for adding n elements in this way is $O(n^2)$