
Algorithm Clone a linked list with *next* and *random* pointers

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1: procedure DEEP_COPY(head)
2:   new_head  $\leftarrow$  clone(head)
3:   backup  $\leftarrow$  new_head
4:   while head.next exist, do
5:     new_head.next  $\leftarrow$  Clone(head.next)
6:     head  $\leftarrow$  head.next
7:     new_head  $\leftarrow$  new_head.next
8:   return backup

9: function CLONE_LINKED_LIST(old_head)
   $\triangleright$  node_just_below is a hash map where the keys are the address of the original list
   $\triangleright$  The values is the address of the corresponding node in the new list

10:  if List is empty then
11:    return

12:  new_head  $\leftarrow$  Deep_Copy(old_head)
13:  current_node  $\leftarrow$  old_head
14:  while current_node exist, do
15:    node_just_below[current_node] = new_head  $\triangleright$  Vertically link the nodes
16:    current_node  $\leftarrow$  current_node.next
17:    new_head  $\leftarrow$  new_head.next

18:  node_just_below[null]  $\leftarrow$  null
19:  for all key in HashMap do  $\triangleright$  Correct all the random pointers
20:    if key is not null then
21:      node_just_below[key].random = node_just_below[key.random]
22:  return node_just_below[old_head]
```
