Identical Linked Lists

Two Linked Lists are identical when they have same data and arrangement of data is also same. For example Linked lists a (1->2->3) and b(1->2->3) are identical. . Write a function to check if the given two linked lists are identical.

Method 1 (Iterative)
To identify if two lists are identical, we need to traverse both lists simultaneously, and while traversing we need to compare data.

```
#include<stdio.h>
#include<stdlib.h>

/* Structure for a linked list node */
struct node
{
  int data;
  struct node *next;
};

/* returns 1 if linked lists a and b are identical, otherwise 0 */
bool areIdentical(struct node *a, struct node *b)
{
  while(1)
  {
    /* base case */
    if(a == NULL && b == NULL)
    {  return 1; }
    if(a == NULL && b != NULL)
    {  return 0; }
    if(a != NULL && b == NULL)
    {  return 0; }
    if(a->data != b->data)
    {  return 0; }
```

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```
    /* If we reach here, then a and b are not NULL and their
       data is same, so move to next nodes in both lists */
    a = a->next;
    b = b->next;
  }
}

/* UTILITY FUNCTIONS TO TEST fun1() and fun2() */
/* Given a reference (pointer to pointer) to the head
  of a list and an int, push a new node on the front
  of the list. */
void push(struct node** head_ref, int new_data)
{
  /* allocate node */
  struct node* new_node =
          (struct node*) malloc(sizeof(struct node));

  /* put in the data  */
  new_node->data  = new_data;

  /* link the old list off the new node */
  new_node->next = (*head_ref);

  /* move the head to point to the new node */
  (*head_ref)    = new_node;
}

/* Druver program to test above function */
int main()
{
  struct node *a = NULL;
  struct node *b = NULL;

  /* The constructed linked lists are :
   a: 3->2->1
   b: 3->2->1 */
  push(&a, 1);
  push(&a, 2);
  push(&a, 3);

  push(&b, 1);
  push(&b, 2);
  push(&b, 3);

  if(areIdentical(a, b) == 1)
    printf(" Linked Lists are identical ");
```

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```
  else
    printf(" Linked Lists are not identical ");

  getchar();
  return 0;
}
```

Method 2 (Recursive)
Recursive solution code is much cleaner than the iterative code. You probably wouldn't want to use the recursive version for production code however, because it will use stack space which is proportional to the length of the lists

```
bool areIdentical(struct node *a, struct node *b)
{
  if (a == NULL && b == NULL)
  {   return 1;   }
  if (a == NULL && b != NULL)
  {   return 0;   }
  if (a != NULL && b == NULL)
  {   return 0;   }
  if (a->data != b->data)
  {   return 0;   }

  /* If we reach here, then a and b are not NULL and their
       data is same, so move to next nodes in both lists */
  return areIdentical(a->next, b->next);
}
```

Time Complexity: O(n) for both iterative and recursive versions. n is the length of the smaller list among a and b.

Please write comments if you find the above codes/algorithms incorrect, or find better ways to solve the same problem.

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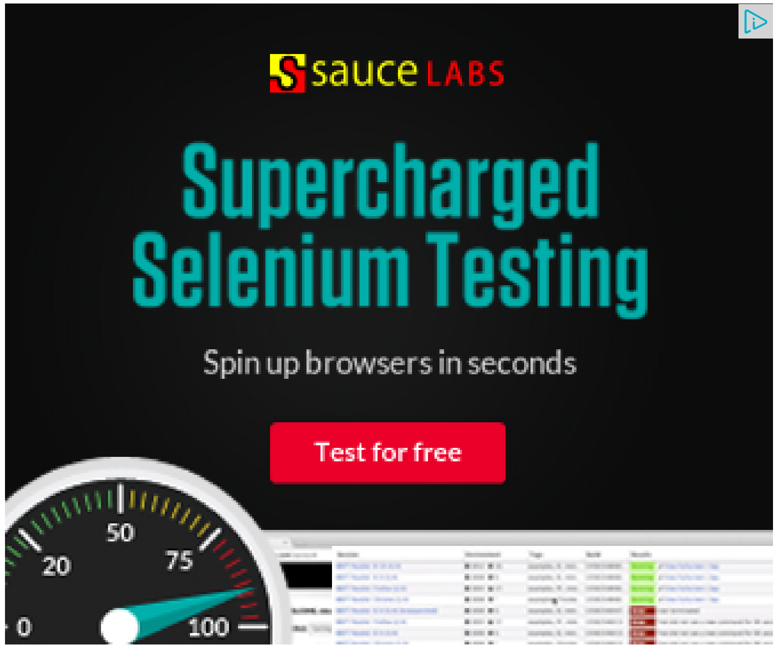

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can refer to below code for recursion method

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neelabhsingh • 6 months ago

what is problem in this method

```
bool areIdentical(struct node *)
{
while(1)
{
if((a==NULL)&&(b==NULL))
return 1;
if(a->data==b->data)
{
a=a->next;
b=b->next;

}
else
return 0;
}
}
```

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mahesh neelabhsingh • 5 months ago

@neelabhsingh consider two list viz. L1=1->2->NULL and L2=1->2->
L2 will give segmentation fault. Due to this condition (a->data==b->dat

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error. Your code works for equal list only.

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neelabhsingh mahesh • 4 months ago

thanks for explanation.

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Sumit Gaur • 9 months ago

bool idendical (node *x, node *y).
{

if(x==NULL&&y==NULL)
return true;
return ((x->data==y->data)&&identical(x->next, y->next));
}

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Saurav Sahu Sumit Gaur • 8 months ago

That will cause Segmentation fault if both lists are not of equal length.

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Deepak Singh • a year ago

thanks for such a beautiful explanation. now concept of linked list isn&#039t to

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cyberlynxs • 2 years ago

In method 2(recursive soln), the function is tail-recursive. If the compilers impl
compilers support it), a single stack-frame will be used. So, I think recursive s
please confirm it?

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Ashish • 4 years ago

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check if a and b are pointing to same node, then the lists would be same by de

the case can also be a Y shaped two LL. so the moment address matches, fe

^ | v • Reply • Share ›

Sambasiva • 4 years ago

```
int areIdentical(list a, list b)
{
     for(; a && b && a->data == b->data; a = a->next, b = b->next);
     return !(a || b);
}
```

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abhikumar18 ➜ Sambasiva • 10 months ago

awesome yar...

```
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piyush ➜ Sambasiva • 2 years ago

GREAT..........

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/* Paste your code here (You may delete these lines if not wri
```

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kapil • 4 years ago

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How about comparing two linked list having same set of elements and same r
here is that elements can be in any order.

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kartik kapil • 4 years ago

There can be two ways to solve this:

1) Sort both lists in O(mLogm + nLogn). After sorting, use the areIdent

2) Use Hashing

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