GeeksforGeeks

A computer science portal for geeks

GeeksQuiz

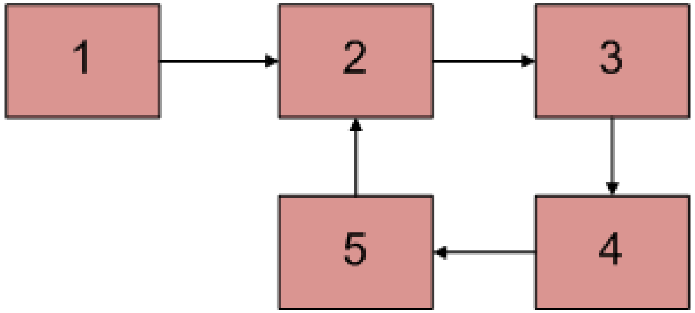
Login

Home Algorithms DS GATE Interview Corner Q&A C C++ Java Books Contribute Ask a Q About

Array Bit Magic C/C++ Articles GFacts Linked List MCQ Misc Output String Tree Graph

Write a C function to detect loop in a linked list

Below diagram shows a linked list with a loop



Following are different ways of doing this

Use Hashing:

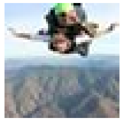
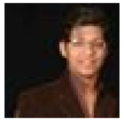
Traverse the list one by one and keep putting the node addresses in a Hash Table. At any point, if NULL is reached then return false and if next of current node points to any of the previously stored nodes in Hash then return true.

Mark Visited Nodes:

This solution requires modifications to basic linked list data structure. Have a visited flag with each node. Traverse the linked list and keep marking visited nodes. If you see a visited node again then there is a loop. This solution works in O(n) but requires additional information with each node.

A variation of this solution that doesn't require modification to basic data structure can be implemented using hash. Just store the addresses of visited nodes in a hash and if you see an address that already exists in hash then there is a loop.

Google™ Custom Search

Interview Experiences
Advanced Data Structures
Dynamic Programming
Greedy Algorithms
Backtracking
Pattern Searching
Divide & Conquer
Mathematical Algorithms
Recursion
Geometric Algorithms

Geometric Algorithms

Floyd’s Cycle-Finding Algorithm:

This is the fastest method. Traverse linked list using two pointers. Move one pointer by one and other pointer by two. If these pointers meet at some node then there is a loop. If pointers do not meet then linked list doesn’t have loop.

Implementation of Floyd’s Cycle-Finding Algorithm:

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

/* Link list node */
struct node
{
  int data;
  struct node* next;
};

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;
}

int detectloop(struct node *list)
{
  struct node  *slow_p = list, *fast_p = list;

  while(slow_p && fast_p &&
          fast_p->next )
  {
    slow_p = slow_p->next;
    fast_p  = fast_p->next->next;
    if (slow_p == fast_p)
    {
       printf("Found Loop");
       return 1;
```

SAMSUNG
SAMSUNG GEAR APP CHALLENGE
Are you GEARed up?
Create the best Samsung Gear App and change your universe.

Popular Posts

All permutations of a given string
Memory Layout of C Programs
Understanding “extern” keyword in C
Median of two sorted arrays
Tree traversal without recursion and without stack!
Structure Member Alignment, Padding and Data Packing
Intersection point of two Linked Lists
Lowest Common Ancestor in a BST.
Check if a binary tree is BST or not
Sorted Linked List to Balanced BST

```
    }
  }
  return 0;
}

/* Drier program to test above function*/
int main()
{
  /* Start with the empty list */
  struct node* head = NULL;

  push(&head, 20);
  push(&head, 4);
  push(&head, 15);
  push(&head, 10);

  /* Create a loop for testing */
  head->next->next->next->next = head;
  detectloop(head);

  getchar();
}
```

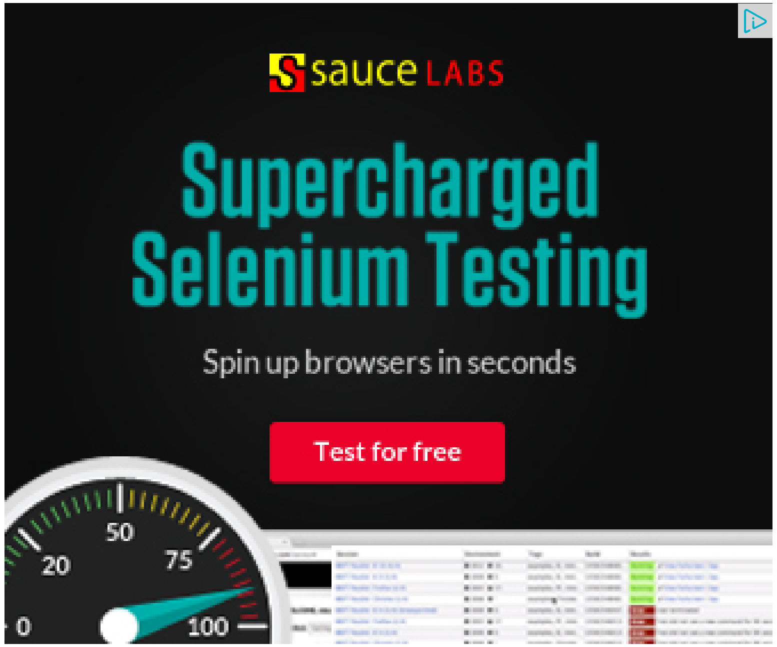
Time Complexity: O(n)

Auxiliary Space: O(1)

References:

http://en.wikipedia.org/wiki/Cycle_detection

http://ostermiller.org/find_loop_singly_linked_list.html



Related Tpoics:

- Given a linked list, reverse alternate nodes and append at the end
- Pairwise swap elements of a given linked list by changing links
- Self Organizing List | Set 1 (Introduction)
- Merge a linked list into another linked list at alternate positions
- QuickSort on Singly Linked List
- Delete N nodes after M nodes of a linked list
- Design a stack with operations on middle element
- Swap Kth node from beginning with Kth node from end in a Linked List

15 Tweet 0 1

Writing code in comment? Please use **ideone.com** and share the link here.

705 Subscribe

Recent Comments

Abhi You live US or India?

Google (Mountain View) interview · 47 minutes ago

Aman Hi, Why arent we checking for conditions...

Write a C program to Delete a Tree. · 1 hour ago

kzs please provide solution for the problem...

Backtracking | Set 2 (Rat in a Maze) · 1 hour ago

Sanjay Agarwal bool tree::Root_to_leaf_path_given_sum(tree...

Root to leaf path sum equal to a given number · 1 hour ago

GOPI GOPINATH @admin Highlight this sentence "We can easily...

Count trailing zeroes in factorial of a number · 1 hour ago

newCoder3006 If the array contains negative numbers also. We...

Find subarray with given sum · 2 hours ago