DETECT LOOP IN LINKED LIST

ALGORITHM

* 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 a 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.

CODE

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| // C++ program to detect loop in a linked list  #include <bits/stdc++.h>  **using** **namespace** std;    /\* Link list node \*/  **struct** Node {  **int** data;  **struct** Node\* next;  **int** flag;  };    **void** push(**struct** Node\*\* head\_ref, **int** new\_data)  {      /\* allocate node \*/  **struct** Node\* new\_node = **new** Node;        /\* put in the data \*/      new\_node->data = new\_data;        new\_node->flag = 0;        /\* 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;  }    // Returns true if there is a loop in linked list  // else returns false.  **bool** detectLoop(**struct** Node\* h)  {  **while** (h != NULL) {          // If this node is already traverse          // it means there is a cycle          // (Because you we encountering the          // node for the second time).  **if** (h->flag == 1)  **return** **true**;            // If we are seeing the node for          // the first time, mark its flag as 1          h->flag = 1;            h = h->next;      }    **return** **false**;  }    /\* Driver 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;    **if** (detectLoop(head))          cout << "Loop found";  **else**          cout << "No Loop";    **return** 0;  } |