Rajalakshmi Engineering College

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 2_MCQ_Updated

Attempt : 1
Total Mark : 20
Marks Obtained : 16

Section 1 : MCQ

1. Which code snippet correctly deletes a node with a given value from a doubly linked list?

```
void deleteNode(Node** head_ref, Node* del_node) {
    if (*head_ref == NULL || del_node == NULL) {
        return;
    }
    if (*head_ref == del_node) {
        *head_ref = del_node->next;
    }
    if (del_node->next != NULL) {
        del_node->next->prev = del_node->prev;
    }
    if (del_node->prev != NULL) {
        del_node->prev->next = del_node->next;
    }
```

```
    free(del_node);
}
```

Answer

Deletes the first occurrence of a given data value in a doubly linked list.

Status : Correct ***Marks : 1/1***

2. Which pointer helps in traversing a doubly linked list in reverse order?

Answer

prev

Status : Correct ***Marks : 1/1***

3. What will be the output of the following program?

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

struct Node {
    int data;
    struct Node* next;
    struct Node* prev;
};

int main() {
    struct Node* head = NULL;
    struct Node* tail = NULL;
    for (int i = 0; i < 5; i++) {
        struct Node* temp = (struct Node*)malloc(sizeof(struct Node));
        temp->data = i + 1;
        temp->prev = tail;
        temp->next = NULL;
        if (tail != NULL) {
            tail->next = temp;
        } else {
            head = temp;
```

```
    }
        tail = temp;
    }
    struct Node* current = head;
    while (current != NULL) {
        printf("%d ", current->data);
        current = current->next;
    }
    return 0;
}
```

Answer

1 2 3 4 5

Status : Correct ***Marks : 1/1***

4. How do you reverse a doubly linked list?

Answer

By swapping the next and previous pointers of each node

Status : Correct ***Marks : 1/1***

5. How many pointers does a node in a doubly linked list have?

Answer

2

Status : Correct ***Marks : 1/1***

6. What happens if we insert a node at the beginning of a doubly linked list?

Answer

The previous pointer of the new node is NULL

Status : Correct ***Marks : 1/1***

7. Which of the following is false about a doubly linked list?

Answer

Implementing a doubly linked list is easier than singly linked list

Status : Correct ***Marks : 1/1***

8. How do you delete a node from the middle of a doubly linked list?

Answer

All of the mentioned options

Status : Correct ***Marks : 1/1***

9. What is a memory-efficient double-linked list?

Answer

Each node has only one pointer to traverse the list back and forth

Status : Wrong ***Marks : 0/1***

10. What does the following code snippet do?

```
struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
newNode->data = value;
newNode->next = NULL;
newNode->prev = NULL;
```

Answer

Inserts a new node at the end of a doubly linked list

Status : Wrong ***Marks : 0/1***

11. Which of the following is true about the last node in a doubly linked list?

Answer

Its next pointer is NULL

Status : Correct ***Marks : 1/1***

12. What will be the effect of setting the prev pointer of a node to NULL in a doubly linked list?

Answer

The node will become the new head

Status : Correct ***Marks : 1/1***

13. Where Fwd and Bwd represent forward and backward links to the adjacent elements of the list. Which of the following segments of code deletes the node pointed to by X from the doubly linked list, if it is assumed that X points to neither the first nor the last node of the list?

A doubly linked list is declared as

```
struct Node {
    int Value;
    struct Node *Fwd;
    struct Node *Bwd;
);
```

Answer

X->Bwd->Fwd = X->Bwd ; X->Fwd->Bwd = X->Fwd;

Status : Wrong ***Marks : 0/1***

14. Consider the following function that refers to the head of a Doubly Linked List as the parameter. Assume that a node of a doubly linked list has the previous pointer as prev and the next pointer as next.

Assume that the reference of the head of the following doubly linked list is passed to the below function 1 <--> 2 <--> 3 <--> 4 <--> 5 <-->6. What should be the modified linked list after the function call?

Procedure fun(head_ref: Pointer to Pointer of node)

```
    temp = NULL
    current = *head_ref

    While current is not NULL
        temp = current->prev
        current->prev = current->next
        current->next = temp
        current = current->prev
    End While

    If temp is not NULL
        *head_ref = temp->prev
    End If
End Procedure
```

Answer

6 <--> 5 <--> 4 <--> 3 <--> 2 <--> 1.

Status : Correct ***Marks : 1/1***

15. What will be the output of the following code?

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

struct Node {
    int data;
    struct Node* next;
    struct Node* prev;
};

int main() {
    struct Node* head = NULL;
    struct Node* temp = (struct Node*)malloc(sizeof(struct Node));
    temp->data = 2;
    temp->next = NULL;
    temp->prev = NULL;
    head = temp;
    printf("%d\n", head->data);
```

```
    free(temp);
    return 0;
}
```

Answer

2

Status : Correct ***Marks : 1/1***

16. What is the correct way to add a node at the beginning of a doubly linked list?

Answer

void addFirst(int data){ Node* newNode = new Node(data); newNode->next = head; if (head != NULL) { head->prev = newNode; } head = newNode; }

Status : Correct ***Marks : 1/1***

17. What is the main advantage of a two-way linked list over a one-way linked list?

Answer

Two-way linked lists allow for traversal in both directions.

Status : Correct ***Marks : 1/1***

18. Consider the provided pseudo code. How can you initialize an empty two-way linked list?

```
Define Structure Node
    data: Integer
    prev: Pointer to Node
    next: Pointer to Node
End Define

Define Structure TwoWayLinkedList
    head: Pointer to Node
```

tail: Pointer to Node
End Define

Answer

struct TwoWayLinkedList list = {NULL, NULL};

Status : Wrong ***Marks : 0/1***

19. Which of the following information is stored in a doubly-linked list's nodes?

Answer

All of the mentioned options

Status : Correct ***Marks : 1/1***

20. Which of the following statements correctly creates a new node for a doubly linked list?

Answer

struct Node* newNode = (struct Node*) malloc(sizeof(struct Node));

Status : Correct ***Marks : 1/1***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 2_COD_Question 1

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Your task is to create a program to manage a playlist of items. Each item is represented as a character, and you need to implement the following operations on the playlist.

Here are the main functionalities of the program:

Insert Item: The program should allow users to add items to the front and end of the playlist. Items are represented as characters.Display Playlist: The program should display the playlist containing the items that were added.

To implement this program, a doubly linked list data structure should be used, where each node contains an item character.

Input Format

The input consists of a sequence of space-separated characters, representing the items to be inserted into the doubly linked list.

The input is terminated by entering - (hyphen).

Output Format

The first line of output prints "Forward Playlist: " followed by the linked list after inserting the items at the end.

The second line prints "Backward Playlist: " followed by the linked list after inserting the items at the front.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: a b c -
Output: Forward Playlist: a b c
Backward Playlist: c b a

Answer

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

struct Node {
    char item;
    struct Node* next;
    struct Node* prev;
};

void insertAtEnd(Node** head, char ch) {
    Node* newNode = (Node*)malloc(sizeof(Node));
    newNode->item = ch;
    newNode->next = NULL;
    newNode->prev = NULL;

    if (*head == NULL) {
        *head = newNode;
        return;
    }
```

```
    Node* temp = *head;
    while (temp->next != NULL)
        temp = temp->next;

    temp->next = newNode;
    newNode->prev = temp;
}

// Display forward
void displayForward(Node* head) {
    while (head != NULL) {
        printf("%c ", head->item);
        head = head->next;
    }
    printf("\n");
}

// Display backward
void displayBackward(Node* tail) {
    while (tail != NULL) {
        printf("%c ", tail->item);
        tail = tail->prev;
    }
    printf("\n");
}

// Free the entire playlist
void freePlaylist(Node* head) {
    Node* temp;
    while (head != NULL) {
        temp = head;
        head = head->next;
        free(temp);
  }
}

int main() {
    struct Node* playlist = NULL;
    char item;

    while (1) {
        scanf(" %c", &item);
```

```
        if (item == '-') {
            break;
        }
        insertAtEnd(&playlist, item);
    }

    struct Node* tail = playlist;
    while (tail->next != NULL) {
        tail = tail->next;
    }

    printf("Forward Playlist: ");
    displayForward(playlist);

    printf("Backward Playlist: ");
    displayBackward(tail);

    freePlaylist(playlist);

    return 0;
}
```

Status : Correct ***Marks : 10/10***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 2_COD_Question 2

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Moniksha, a chess coach organizing a tournament, needs a program to manage participant IDs efficiently. The program maintains a doubly linked list of IDs and offers two functions: Append to add IDs as students register, and Print Maximum ID to identify the highest ID for administrative tasks.

This tool streamlines tournament organization, allowing Moniksha to focus on coaching her students effectively.

Input Format

The first line consists of an integer n, representing the number of participant IDs to be added.

The second line consists of n space-separated integers representing the participant IDs.

Output Format

The output displays a single integer, representing the maximum participant ID.

If the list is empty, the output prints "Empty list!".

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 3
163 137 155
Output: 163

Answer

```
// You are using GCC
#include <stdio.h>
#include <stdlib.h>

typedef struct Node {
    int data;
    struct Node* prev;
    struct Node* next;
} Node;

typedef struct DoublyLinkedList {
    Node* head;
    Node* tail;
} DoublyLinkedList;

void append(DoublyLinkedList* list, int data) {
    Node* newNode = (Node*)malloc(sizeof(Node));
    newNode->data = data;
    newNode->prev = NULL;
    newNode->next = NULL;

    if (list->tail == NULL) {  // If list is empty
        list->head = list->tail = newNode;
    } else {
        list->tail->next = newNode;
```

```
        newNode->prev = list->tail;
        list->tail = newNode;
    }
}

int findMax(DoublyLinkedList* list) {
    if (list->head == NULL) {
        printf("Invalid input size!\n");
        return -1;
    }

    Node* current = list->head;
    int maxID = current->data;

    while (current != NULL) {
        if (current->data > maxID) {
            maxID = current->data;
        }
        current = current->next;
    }

    return maxID;
}

int main() {
    DoublyLinkedList list = {NULL, NULL};

    int n, id;
    scanf("%d", &n);

    if (n < 1 || n > 20) {
        printf("Empty list!\n");
        return 0;
    }

    for (int i = 0; i < n; i++) {
        scanf("%d", &id);
        if (id < 1 || id > 10000000) {
            printf("Invalid ID!\n");
            return 0;
        }
        append(&list, id);
```

```
    }

    int maxID = findMax(&list);
    if (maxID != -1) {
        printf("%d\n", maxID);
    }

    return 0;
}
```

Status : Correct ***Marks : 10/10***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 2_COD_Question 3

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Bob is tasked with developing a company's employee record management system. The system needs to maintain a list of employee records using a doubly linked list. Each employee is represented by a unique integer ID.

Help Bob to complete a program that adds employee records at the front, traverses the list, and prints the same for each addition of employees to the list.

Input Format

The first line of input consists of an integer N, representing the number of employees.

The second line consists of N space-separated integers, representing the employee IDs.

Output Format

For each employee ID, the program prints "Node Inserted" followed by the current state of the doubly linked list in the next line, with the data values of each node separated by spaces.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 4
101 102 103 104
Output: Node Inserted
101
Node Inserted
102 101
Node Inserted
103 102 101
Node Inserted
104 103 102 101

Answer

```
#include <iostream>
using namespace std;

struct node {
   int info;
   struct node* prev, * next;
};

struct node* start = NULL;

void traverse()
{
   struct node*temp=start;
   while(temp!=NULL){
      printf("%d ",temp->info);
      temp=temp->next;


   }
```

```
    printf("\n");

}
void insertAtFront(int data)
{
    struct node*nnode=(struct node*)malloc(sizeof(node));
    nnode->info=data;
    nnode->prev=NULL;
    nnode->next=start;
    if(start!=NULL){
        start->prev=nnode;
    }
    start=nnode;
    printf("Node Inserted\n");
}




int main() {
    int n, data;
    cin >> n;
    for (int i = 0; i < n; ++i) {
        cin >> data;
        insertAtFront(data);
        traverse();
    }
    return 0;
}
```

Status : Correct **Marks : 10/10**

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 2_COD_Question 4

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Ravi is developing a student registration system for a college. To efficiently store and manage the student IDs, he decides to implement a doubly linked list where each node represents a student's ID.

In this system, each student's ID is stored sequentially, and the system needs to display all registered student IDs in the order they were entered.

Implement a program that creates a doubly linked list, inserts student IDs, and displays them in the same order.

Input Format

The first line contains an integer N the number of student IDs.

The second line contains N space-separated integers representing the student IDs.

Output Format

The output should display the single line containing N space-separated integers representing the student IDs stored in the doubly linked list.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
10 20 30 40 50
Output: 10 20 30 40 50

Answer

```
// You are using GCC
#include <stdio.h>
#include <stdlib.h>

typedef struct Node {
    int data;
    struct Node* prev;
    struct Node* next;
} Node;

typedef struct DoublyLinkedList {
    Node* head;
    Node* tail;
} DoublyLinkedList;

void append(DoublyLinkedList* list, int data) {
    Node* newNode = (Node*)malloc(sizeof(Node));
    newNode->data = data;
    newNode->prev = NULL;
    newNode->next = NULL;

    if (list->tail == NULL) {  // If the list is empty
        list->head = list->tail = newNode;
    } else {
```

```
        list->tail->next = newNode;
        newNode->prev = list->tail;
        list->tail = newNode;
    }
}

void display(DoublyLinkedList* list) {
    Node* current = list->head;
    while (current != NULL) {
        printf("%d ", current->data);
        current = current->next;
    }
    printf("\n");
}

int main() {
    DoublyLinkedList list = {NULL, NULL};

    int n, id;
    scanf("%d", &n);

    if (n < 1 || n > 10) {
        printf("Invalid input size!\n");
        return 0;
    }

    for (int i = 0; i < n; i++) {
        scanf("%d", &id);
        if (id < 1 || id > 1000000) {
            printf("Invalid ID!\n");
            return 0;
        }
        append(&list, id);
    }

    display(&list);

  return 0;
}
```

Status : Correct **Marks : 10/10**

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 2_COD_Question 5

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Ashwin is tasked with developing a simple application to manage a list of items in a shop inventory using a doubly linked list. Each item in the inventory has a unique identification number. The application should allow users to perform the following operations:

Create a List of Items: Initialize the inventory with a given number of items. Each item will be assigned a unique number provided by the user and insert the elements at end of the list.

Delete an Item: Remove an item from the inventory at a specific position.

Display the Inventory: Show the list of items before and after deletion.

If the position provided for deletion is invalid (e.g., out of range), it should

display an error message.

Input Format

The first line contains an integer n, representing the number of items to be initially entered into the inventory.

The second line contains n integers, each representing the unique identification number of an item separated by spaces.

The third line contains an integer p, representing the position of the item to be deleted from the inventory.

Output Format

The first line of output prints "Data entered in the list:" followed by the data values of each node in the doubly linked list before deletion.

If p is an invalid position, the output prints "Invalid position. Try again."

If p is a valid position, the output prints "After deletion the new list:" followed by the data values of each node in the doubly linked list after deletion.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 4
1 2 3 4
5
Output: Data entered in the list:
 node 1 : 1
 node 2 : 2
 node 3 : 3
 node 4 : 4
Invalid position. Try again.

Answer

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

```
typedef struct Node {
    int data;
    struct Node* prev;
    struct Node* next;
} Node;

// Function to insert at the end
void insertAtEnd(Node** head, int value) {
    Node* newNode = (Node*)malloc(sizeof(Node));
    newNode->data = value;
    newNode->next = NULL;
    newNode->prev = NULL;

    if (*head == NULL) {
        *head = newNode;
        return;
    }

    Node* temp = *head;
    while (temp->next != NULL)
        temp = temp->next;

    temp->next = newNode;
    newNode->prev = temp;
}

// Function to display the list
void displayList(Node* head) {
    int index = 1;
    while (head != NULL) {
        printf("node %d : %d\n", index++, head->data);
        head = head->next;
    }
}

// Function to delete node at a given 1-based position
int deleteAtPosition(Node** head, int pos) {
    if (*head == NULL || pos <= 0)
        return 0;

    Node* temp = *head;
```

```
    int count = 1;

    while (temp != NULL && count < pos) {
        temp = temp->next;
        count++;
    }

    if (temp == NULL)
        return 0; // Invalid position

    if (temp->prev != NULL)
        temp->prev->next = temp->next;
    else
        *head = temp->next; // Deleting head

    if (temp->next != NULL)
        temp->next->prev = temp->prev;

    free(temp);
    return 1; // Successfully deleted
}

// Free memory
void freeList(Node* head) {
    Node* temp;
    while (head != NULL) {
        temp = head;
        head = head->next;
        free(temp);
    }
}

int main() {
    Node* head = NULL;
    int n, value, pos;

    scanf("%d", &n);
    for (int i = 0; i < n; i++) {
        scanf("%d", &value);
        insertAtEnd(&head, value);
    }
```

```
    scanf("%d", &pos);

    printf("Data entered in the list:\n");
    displayList(head);

    if (!deleteAtPosition(&head, pos)) {
        printf("Invalid position. Try again.\n");
    } else {
        printf("After deletion the new list:\n");
        displayList(head);
    }

    freeList(head);
  return 0;
}
```

Status : Correct **Marks : 10/10**