DSA ASSIGNMENT 4

BT22CSH011

Devashish Athawale

Problem Statement:

Create a doubly linked list in which info part of each node stores 4 digits of a given number. The digits should be stored in reverse order so that the LSB bits are stored in the first node and MSB bits in the last node. If the number is 681325468132 then the linked list should be 2318 -> 6452 -> 3168. Write a function to add two numbers represented in this way. Justify the time and space complexity.

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

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

struct node* create(struct node* head, int n)
{
	struct node* last, * newnode;
	head = (struct node*)malloc(sizeof(struct node));
	head->data = n % 10000;
	head->next = NULL;
	head->prev = NULL;
	last = head;
	n /= 10000;
	while (n > 0)
	{
		newnode = (struct node*)malloc(sizeof(struct node));
		newnode->data = n % 10000;
		newnode->next = NULL;
		last->next = newnode;
		newnode->prev = last;
		last = newnode;
		n /= 10000;
	}
	return head;
}

struct node* push(struct node* head, int n)
{
	struct node* temp;
	struct node* p = head;
	temp = (struct node*)malloc(sizeof(struct node));
	temp->data = n;
	temp->prev = NULL;
	temp->next = NULL;
	if (head == NULL)
	{
		head = temp;
		return head;
	}

	while (p->next)
		p = p->next;

	p->next = temp;
	temp->prev = p;
	return head;
}
```

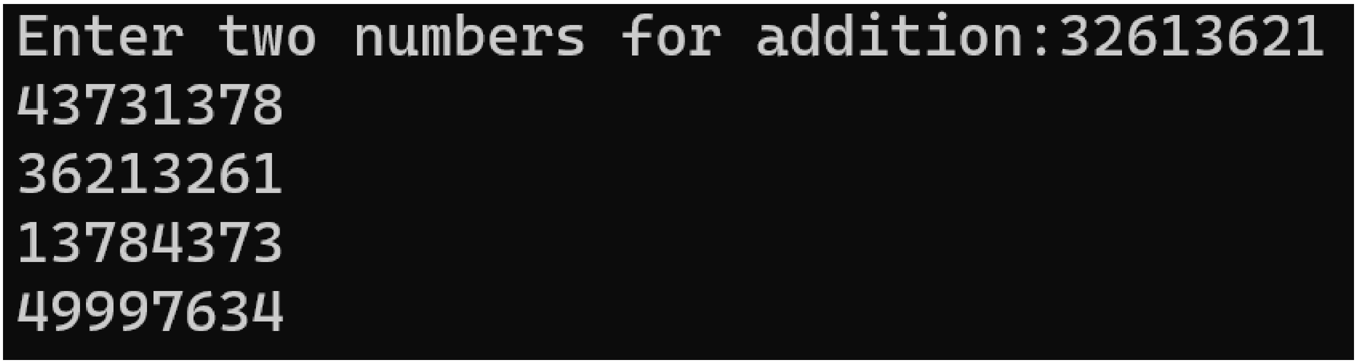
```
struct node* addition(struct node* poly1, struct node* poly2)
{
    struct node* result = NULL;
    struct node* p1 = poly1;
    struct node* p2 = poly2;
    if (p1 == NULL)
    return p2;
    if (p2 == NULL)
    return p1;
    int sum = 0, carry = 0;
    while (p1 || p2)
    {
        sum = 0;
        if (p1)
        {
            sum += p1->data;
            p1 = p1->next;
        }
        if (p2)
        {
            sum += p2->data;
            p2 = p2->next;
        }
        sum += carry;
        carry = sum / 10000;
        sum = sum % 10000;
        result = push(result, sum);
    }
    if (carry)
        result = push(result, carry);
    return result;
}

void display(struct node *p)
{
    while (p)
    {
        cout << p->data;
        p = p->next;
    }

    cout<<endl;
}
```

```
int main()
{
	struct node* poly1 = NULL, * poly2 = NULL, * result;
	unsigned long long int n1, n2;
	printf("Enter two numbers for addition:");
	cin >> n1;
	cin >> n2;
	poly1 = create(poly1, n1);
	poly2 = create(poly2, n2);

	display(poly1);
	display(poly2);
	result = addition(poly1, poly2);
	display(result);
	return 0;
}
```



```
Enter two numbers for addition:32613621
43731378
36213261
13784373
49997634
```