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#include <stdio.h>
#include <stdlib.h>
// Node creation
typedef struct Node
{
    int coeff;
    int expo;
    struct Node *next;
} Node;
// Poly type creation
typedef struct
{
    Node *start;
} Poly;

void create(Poly *ptr)
{
    Node *p, *prev;
    int ch;
    do
    {
        p = (Node *)malloc(sizeof(Node));
        printf("Enter the coefficient:\n");
        scanf("%d", &p->coeff);
        printf("Enter its exponent:\n");
        scanf("%d", &p->expo);
        p->next = NULL;
        if (ptr->start == NULL) // first node
        {
            ptr->start = p;
        }
        else
        {
            prev->next = p;
        }
        prev = p;

        printf("Enter 1 to continue creation of list and 0 to end it:\n");
        scanf("%d", &ch);
    } while (ch == 1);
}

void display(Poly poly)
{
    Node *ptr;
    ptr = poly.start;
    while (ptr != NULL)
    {

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        printf(" %dx^%d", ptr->coeff, ptr->expo);
        if (ptr->next != NULL)
            printf(" + ");
        ptr = ptr->next;
    }
    printf("\n");
}

void append(Poly *ptr, int coeff, int expo)
{
    Node *q, *p;
    p = (Node *)malloc(sizeof(Node));
    p->coeff = coeff;
    p->expo = expo;
    p->next = NULL;
    if (ptr->start == NULL)
    {
        ptr->start = p;
    }
    else
    {
        q = ptr->start;        // start traversing from the first node
        while (q->next != NULL)
            q = q->next;
        q->next = p;
    }
}

void add(Poly *result, Poly poly1, Poly poly2)
{
    int sum;
    Node *ptr1 = poly1.start, *ptr2 = poly2.start;

    while (ptr1 != NULL && ptr2 != NULL)
    {
        if (ptr1->expo == ptr2->expo)
        {
            sum = ptr1->coeff + ptr2->coeff;
            append(result, sum, ptr1->expo);
            ptr1 = ptr1->next;
            ptr2 = ptr2->next;
        }
        else if (ptr1->expo > ptr2->expo)
        {
            append(result, ptr1->coeff, ptr1->expo);
            ptr1 = ptr1->next;
        }
        else
        {
            append(result, ptr2->coeff, ptr2->expo);

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        ptr2 = ptr2->next;
    }
}
if (ptr1 == NULL)
{
    while (ptr2 != NULL)
    {
        append(result, ptr2->coeff, ptr2->expo);
        ptr2 = ptr2->next;
    }
}
if (ptr2 == NULL)
{
    while (ptr1 != NULL)
    {
        append(result, ptr1->coeff, ptr1->expo);
        ptr1 = ptr1->next;
    }
}
}
int main()
{
    int option;
    Poly poly1, poly2, result;
    poly1.start = NULL;
    poly2.start = NULL;
    result.start = NULL;

    do
    {
        printf("Enter the option:1.Create polynomial-1 2.Create polynomial-2
3.Add both polynomial 4.Exit\n");
        scanf("%d", &option);
        switch (option)
        {
            case 1:
                create(&poly1);
                printf("First polynomial created:\n");
                display(poly1);
                break;
            case 2:
                create(&poly2);
                printf("Second polynomial created:\n");
                display(poly2);
                break;
            case 3:
                add(&result, poly1, poly2);

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        printf("Resultant polynomial:\n");
        display(result);
        break;
    case 4:
        exit(0);
    default:
        printf("Enter a valid option.\n");
    }
} while (1);
return 0;
}

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Enter the option:1.Create polynomial-1 2.Create polynomial-2 3.Add both polynomial 4.Exit
1
Enter the coefficient:
3
Enter its exponent:
2
Enter 1 to continue creation of list and 0 to end it:
1
Enter the coefficient:
2
Enter its exponent:
1
Enter 1 to continue creation of list and 0 to end it:
0
First polynomial created:
3x^2 + 2x^1
Enter the option:1.Create polynomial-1 2.Create polynomial-2 3.Add both polynomial 4.Exit
2
Enter the coefficient:
4
Enter its exponent:
2
Enter 1 to continue creation of list and 0 to end it:
1
Enter the coefficient:
3
Enter its exponent:
1
Enter 1 to continue creation of list and 0 to end it:
0
Second polynomial created:
4x^2 + 3x^1
Enter the option:1.Create polynomial-1 2.Create polynomial-2 3.Add both polynomial 4.Exit
3
Resultant polynomial:
7x^2 + 5x^1
Enter the option:1.Create polynomial-1 2.Create polynomial-2 3.Add both polynomial 4.Exit
4
PS C:\Users\Mark Lopes> █

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