

**Ex No: 10**

**Date:**

## **IMPLEMENT CODE OPTIMIZATION TECHNIQUES DEAD CODE AND COMMON SUB EXPRESSION ELIMINATION**

**AIM:**

To write a C program to implement the dead code elimination and common sub expression elimination (code optimization) techniques.

**ALGORITHM:**

- Start
- Create the input file which contains three address code.
- Open the file in read mode.
- If the file pointer returns NULL, exit the program else go to 5.
- Scan the input symbol from left to right.
- Store the first expression in a string.
- Compare the string with the other expressions in the file.
- If there is a match, remove the expression from the input file.
- Perform these steps 5-8 for all the input symbols in the file.
- Scan the input symbol from the file from left to right.
- Get the operand before the operator from the three address code.
- Check whether the operand is used in any other expression in the three address code.
- If the operand is not used, then eliminate the complete expression from the three-address code else go to 14.
- Perform steps 11 to 13 for all the operands in the three address code till end of the file is reached.
- Stop.

**PROGRAM:**

```
#include<stdio.h>
#include<conio.h>
#include<string.h>
struct op
{
    char l;
    char r[20];
}
op[10], pr[10];

void main()
{
    int a, i, k, j, n, z = 0, m, q;
```

```

char * p, * l;
char temp, t;
char * tem;
clrscr();
printf("enter no of values");
scanf("%d", & n);
for (i = 0; i < n; i++)
{
    printf("\tleft\t");
    op[i].l = getche();
    printf("\tright:\t");
    scanf("%s", op[i].r);
}
printf("intermediate Code\n");
for (i = 0; i < n; i++)
{
    printf("%c=", op[i].l);
    printf("%s\n", op[i].r);
}
for (i = 0; i < n - 1; i++)
{
    temp = op[i].l;
    for (j = 0; j < n; j++)
    {
        p = strchr(op[j].r, temp);
        if (p)
        {
            pr[z].l = op[i].l;
            strcpy(pr[z].r, op[i].r);
            z++;
        }
    }
}
pr[z].l = op[n - 1].l;
strcpy(pr[z].r, op[n - 1].r);
z++;
printf("\nafter dead code elimination\n");
for (k = 0; k < z; k++)
{
    printf("%c\t=", pr[k].l);
    printf("%s\n", pr[k].r);
}

//sub expression elimination
for (m = 0; m < z; m++)
{

```

```

    tem = pr[m].r;
    for (j = m + 1; j < z; j++)
    {
        p = strstr(tem, pr[j].r);
        if (p)
        {
            t = pr[j].l;
            pr[j].l = pr[m].l;
            for (i = 0; i < z; i++)
            {
                l = strchr(pr[i].r, t);
                if (l) {
                    a = l - pr[i].r;
                    //printf("pos: %d", a);
                    pr[i].r[a] = pr[m].l;
                }
            }
        }
    }
    printf("eliminate common expression\n");
    for (i = 0; i < z; i++) {
        printf("%c\t=", pr[i].l);
        printf("%s\n", pr[i].r);
    }
    // duplicate production elimination

    for (i = 0; i < z; i++)
    {
        for (j = i + 1; j < z; j++)
        {
            q = strcmp(pr[i].r, pr[j].r);
            if ((pr[i].l == pr[j].l) && !q)

            {
                pr[i].l = '\0';
                strcpy(pr[i].r, "\0");
            }
        }
    }
    printf("optimized code");
    for (i = 0; i < z; i++)
    {
        if (pr[i].l != '\0') {
            printf("%c=", pr[i].l);
            printf("%s\n", pr[i].r);
        } } getch();

```

}

## OUTPUT:

```
(kali㉿kali)-[~/Documents/cdlab]
$ vi exp10.c

(kali㉿kali)-[~/Documents/cdlab]
$ gcc exp10.c

(kali㉿kali)-[~/Documents/cdlab]
$ ./a.out
Enter no of values: 5
    Left:  a
    Right:  9
    Left:  b
    Right:  c+d
    Left:  e
    Right:  c+d
    Left:  f
    Right:  b+e
    Left:  r
    Right:  f

Intermediate Code
a=9
b=c+d
e=c+d
f=b+e
r=f

After Dead Code Elimination
b      =c+d
e      =c+d
f      =b+e
r      =f

Eliminate Common Expression
b      =c+d
b      =c+d
f      =b+b
r      =f
```

## RESULT:

Thus, a C program to implement the dead code elimination and common sub expression elimination (code optimization) techniques has been developed.