

**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;
```

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```

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:**

```
[root@localhost-live 210701283]# vi expl0.c
[root@localhost-live 210701283]# cc expl0.c
[root@localhost-live 210701283]# ./a.out
Enter number of values: 3
Enter left and right values:
    left: a
    right: 9
    left: b
    right: c+d
    left: f
    right: b+e

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

Optimized Code:
b=c+d
f = b+e
```

**RESULT:**