

**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.