**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++)
{
```

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```
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 (I) {
       a = I - 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();
```

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}

### **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:
        Right: 9
        Left: b
        Right: c+d
        Left:
        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
       =c+d
e
       =b+e
        =f
Eliminate Common Expression
        =c+d
b
b
        =c+d
f
        =b+b
        = f
```

## **RESULT:**

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

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