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.

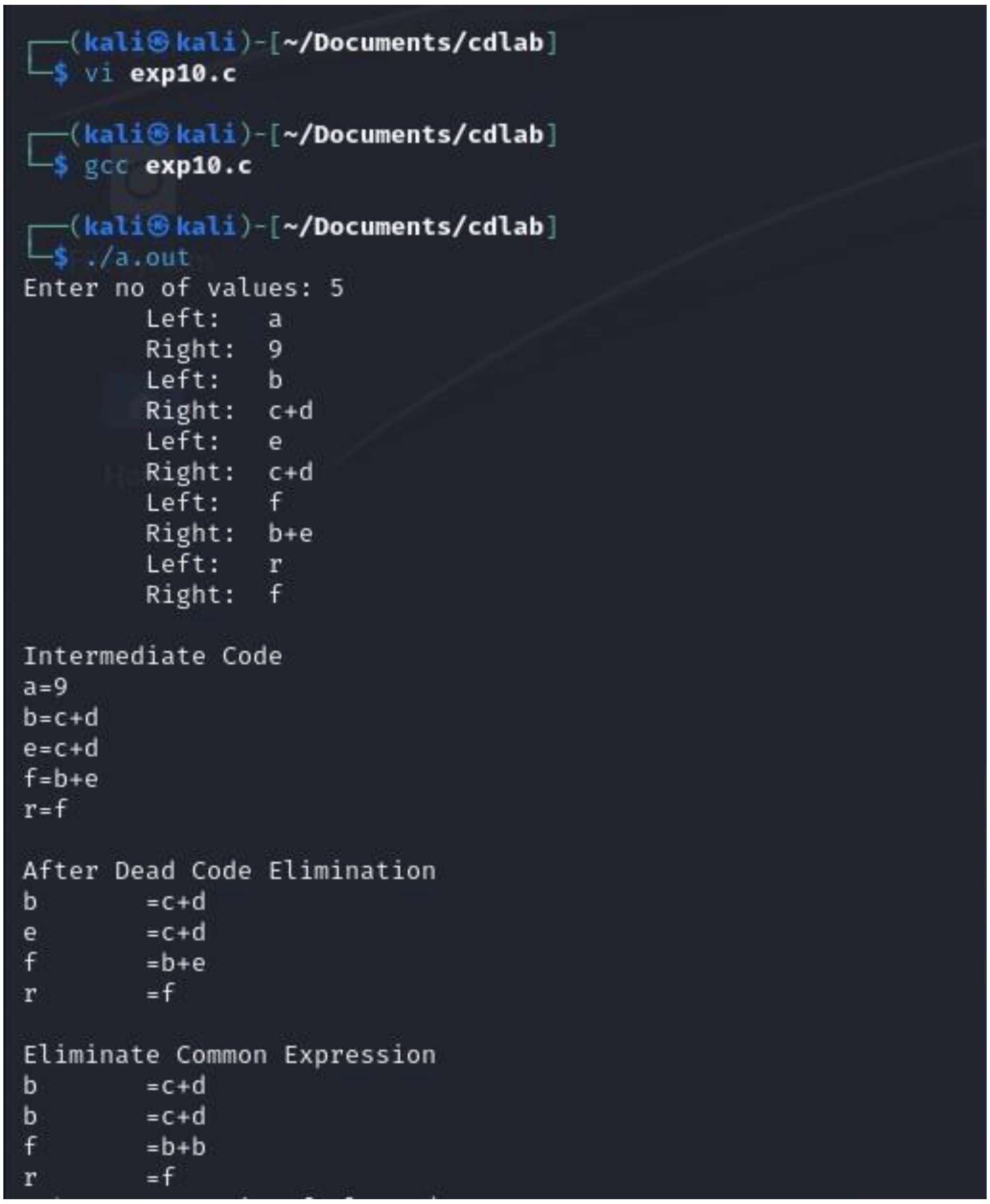
PROGRAM:

```
#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.