

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.