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:

```c
#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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```c
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++)
{
```

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```
        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:

```
[VaruneshB210701303@localhost ~]$ vi code303.c
[VaruneshB210701303@localhost ~]$ cc code303.c
[VaruneshB210701303@localhost ~]$ ./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
[VaruneshB210701303@localhost ~]$
```

RESULT:

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