Compiler Design

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T1

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Exp 11: Intermediate code generation – Quadruple, Triple, Indirect triple

Aim: A program to implement intermediate code generation - Quadruple, Triple, Indirect triple.

Algorithm:

The algorithm takes a sequence of three-address statements as input. For each three address statements of the form a:= b op c perform the various actions. These are as follows:

1. Invoke a function getreg to find out the location L where the result of computation b op c should be stored.
2. Consult the address description for y to determine y'. If the value of y currently in memory and register both then prefer the register y' . If the value of y is not already in L then generate the instruction MOV y' , L to place a copy of y in L.
3. Generate the instruction OP z' , L where z' is used to show the current location of z. if z is in both then prefer a register to a memory location. Update the address descriptor of x to indicate that x is in location L. If x is in L then update its descriptor and remove x from all other descriptors.
4. If the current value of y or z have no next uses or not live on exit from the block or in register then alter the register descriptor to indicate that after execution of x : = y op z those register will no longer contain y or z.

Program:

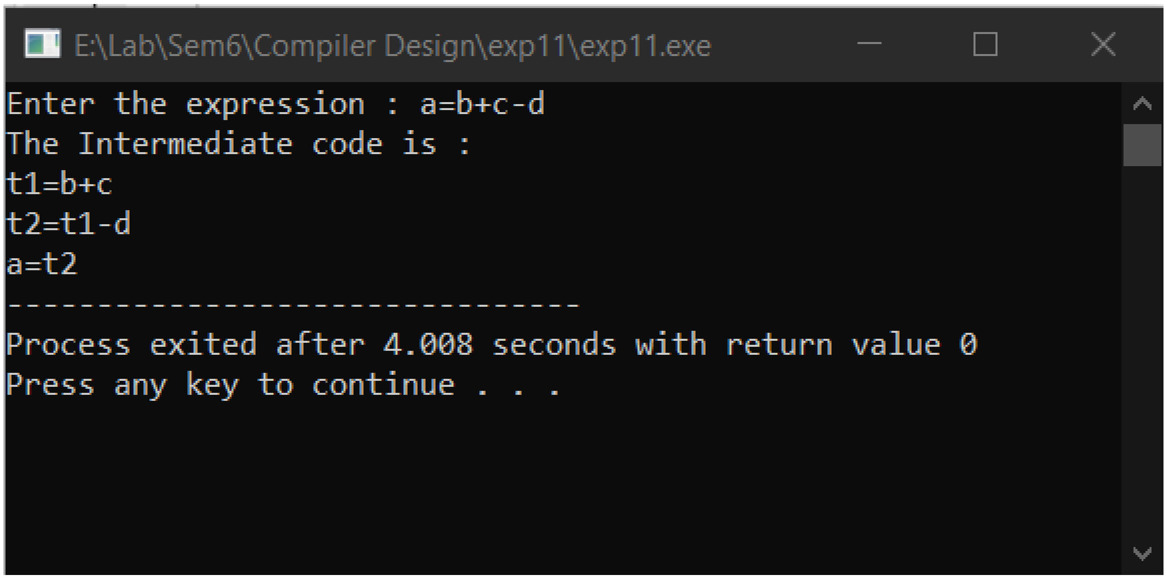
```
#include<stdio.h>
#include<ctype.h>
#include<stdlib.h>
```

```
#include<string.h>
void small();
void dove(int i);
int p[5]={0,1,2,3,4},c=1,i,k,l,m,pi;
char sw[5]={'=','-','+','/','*'},j[20],a[5],b[5],ch[2];
void main()
{
    printf("Enter the expression : ");
    scanf("%s",j);
    printf("The Intermediate code is :\n");
    small();
}
void dove(int i)
{
    a[0]=b[0]='\0';
    if(!isdigit(j[i+2])&&!isdigit(j[i-2]))
    {
        a[0]=j[i-1];
        b[0]=j[i+1];
    }
    if(isdigit(j[i+2]))
    {
        a[0]=j[i-1];
        b[0]='t';
        b[1]=j[i+2];
    }
    if(isdigit(j[i-2]))
    {
        b[0]=j[i+1];
        a[0]='t';
        a[1]=j[i-2];
        b[1]='\0';
    }
    if(isdigit(j[i+2]) &&isdigit(j[i-2]))
    {
        a[0]='t';
        b[0]='t';
        a[1]=j[i-2];
        b[1]=j[i+2];
        sprintf(ch,"%d",c);
        j[i+2]=j[i-2]=ch[0];
    }
    if(j[i]=='*')
        printf("t%d=%s*%s\n",c,a,b);
    if(j[i]=='/')
        printf("t%d=%s/%s\n",c,a,b);
    if(j[i]=='+')
        printf("t%d=%s+%s\n",c,a,b);if(j[i]=='-')
    printf("t%d=%s-%s\n",c,a,b);
    if(j[i]=='=')
        printf("%c=t%d",j[i-1],--c);
    sprintf(ch,"%d",c);
    j[i]=ch[0];
    c++;
    small();
}
void small()
{
    pi=0;l=0;
    for(i=0;i<strlen(j);i++)
    {
        for(m=0;m<5;m++)
        if(j[i]==sw[m])
        if(pi<=p[m])
        {
            pi=p[m];
            l=1;
            k=i;
        }
    }
    if(l==1)
    dove(k);
    else
    exit(0);
}
```

Input:

a=b+c-d

Output:



```
Enter the expression : a=b+c-d
The Intermediate code is :
t1=b+c
t2=t1-d
a=t2
--------------------------------
Process exited after 4.008 seconds with return value 0
Press any key to continue . . .
```

Result: A program to implement intermediate code generation - Quadruple, Triple, Indirect triple has been compiled and run successfully.