Exp-10 Intermediate Code Generation (ICG) Quadruples, Triples, Indirect triples

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Aim:
To implement Intermediate code generation – Quadruples, Triples, Indirect triples.

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.

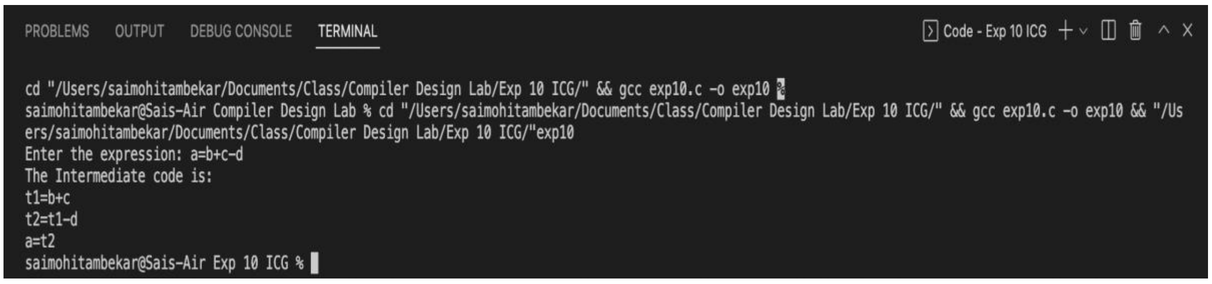
Program:

```
#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];

int 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];
```

```c
    }
    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\n", 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);
}
```

Output:



```
cd "/Users/saimohitambekar/Documents/Class/Compiler Design Lab/Exp 10 ICG/" && gcc exp10.c -o exp10
saimohitambekar@Sais-Air Compiler Design Lab % cd "/Users/saimohitambekar/Documents/Class/Compiler Design Lab/Exp 10 ICG/" && gcc exp10.c -o exp10 && "/Us
ers/saimohitambekar/Documents/Class/Compiler Design Lab/Exp 10 ICG/"exp10
Enter the expression: a=b+c-d
The Intermediate code is:
t1=b+c
t2=t1-d
a=t2
saimohitambekar@Sais-Air Exp 10 ICG %
```

Result:
The program was successfully compiled and run.