Name: Atandrit Chatterjee

Reg. No.: RA2011031010042

**Experiment-12 Simple Code Generator**

Aim:

To implement simple code generator in C/C++.

Procedure:

1. Parse the input code and generate an abstract syntax tree (AST).
2. Traverse the AST and generate intermediate code (e.g. three-address code).
3. Optimize the intermediate code to improve performance.
4. Generate target code (e.g. machine code) from the optimized intermediate code.
5. Output the generated code to a file or execute it directly.

Code:

```
#include <iostream>
#include <cstdio>
#include <cstring>
#include <cctype>
using namespace std;
```

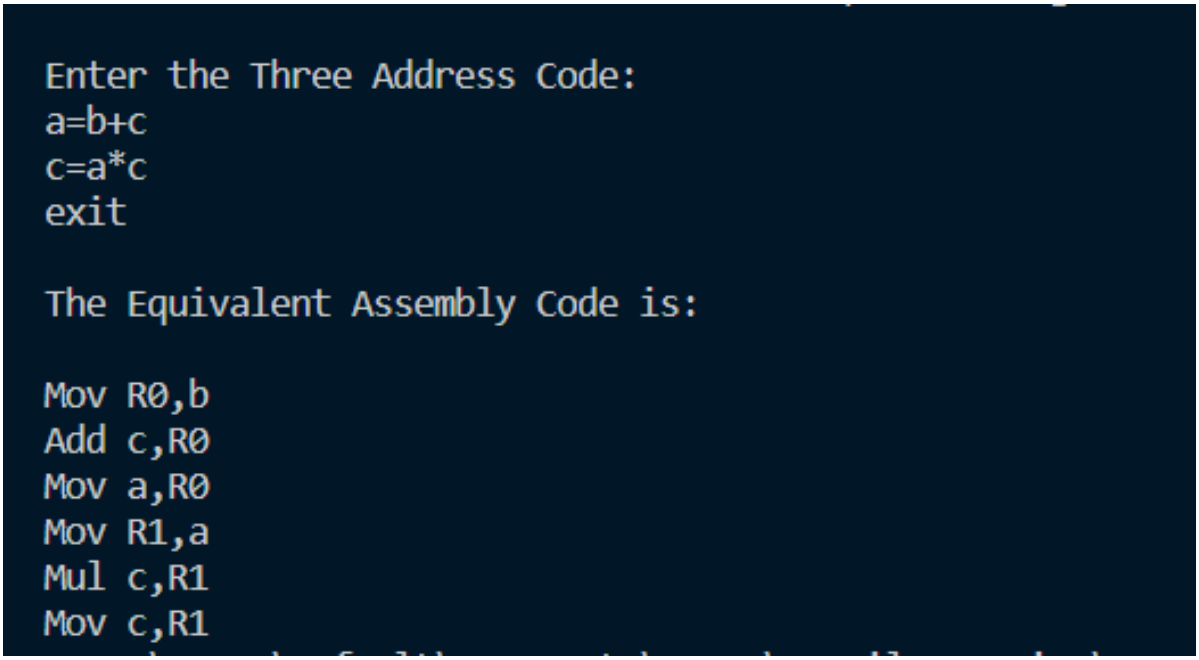
```
typedef struct
{
    char var[10];
    int alive;
} regist;

regist preg[10];

void substring(char exp[], int st, int end)
{
    int i, j = 0;
    char dup[10] = "";
    for (i = st; i < end; i++)
        dup[j++] = exp[i];
    dup[j] = '0';
    strcpy(exp, dup);
}

int getregister(char var[])
{
    int i;
    for (i = 0; i < 10; i++)
    {
        if (preg[i].alive == 0)
        {
            strcpy(preg[i].var, var);
            break;
        }
```

```
    }
    return (i);
}

void getvar(char exp[], char v[])
{
    int i, j = 0;
    char var[10] = "";
    for (i = 0; exp[i] != '\0'; i++)
        if (isalpha(exp[i]))
            var[j++] = exp[i];
        else
            break;
    strcpy(v, var);
}

int main()
{
    char basic[10][10], var[10][10], fstr[10], op;
    int i, j, k, reg, vc, flag = 0;
    cout << "\nEnter the Three Address Code:\n";
    for (i = 0;; i++)
    {
        cin.getline(basic[i], 10);
        if (strcmp(basic[i], "exit") == 0)
            break;
    }
    cout << "\nThe Equivalent Assembly Code is:\n";
```

```
for (j = 0; j < i; j++)
{
   getvar(basic[j], var[vc++]);
   strcpy(fstr, var[vc - 1]);
   substring(basic[j], strlen(var[vc - 1]) + 1, strlen(basic[j]));
   getvar(basic[j], var[vc++]);
   reg = getregister(var[vc - 1]);
   if (preg[reg].alive == 0)
   {
      printf("\nMov R%d,%s", reg, var[vc - 1]);
      preg[reg].alive = 1;
   }
   op = basic[j][strlen(var[vc - 1])];
   substring(basic[j], strlen(var[vc - 1]) + 1, strlen(basic[j]));
   getvar(basic[j], var[vc++]);
   switch (op)
   {
   case '+':
      cout << "\nAdd";
      break;
   case '-':
      cout << "\nSub";
      break;
   case '*':
      cout << "\nMul";
      break;
   case '/':
      cout << "\nDiv";
```

```
            break;
        }
        flag = 1;
        for (k = 0; k <= reg; k++)
        {
            if (strcmp(preg[k].var, var[vc - 1]) == 0)
            {
                cout << "R" << k << ", R" << reg;
                preg[k].alive = 0;
                flag = 0;
                break;
            }
        }
        if (flag)
        {
            printf(" %s,R%d", var[vc - 1], reg);
            printf("\nMov %s,R%d", fstr, reg);
        }
        strcpy(preg[reg].var, var[vc - 3]);
    }
    return 0;
}
```

Output:




Result:

The implementation of simple code generator was successful.