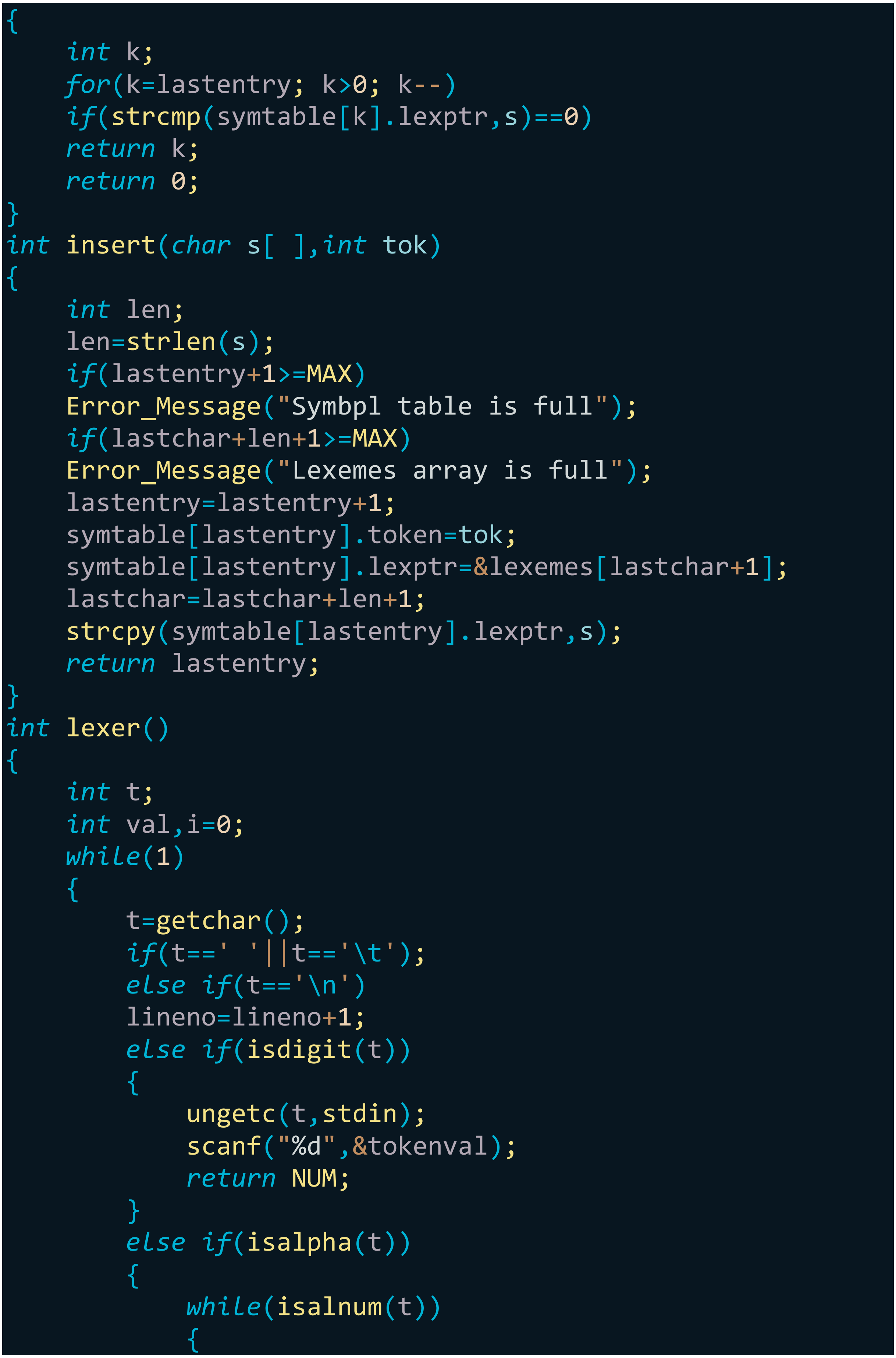
Mini Project

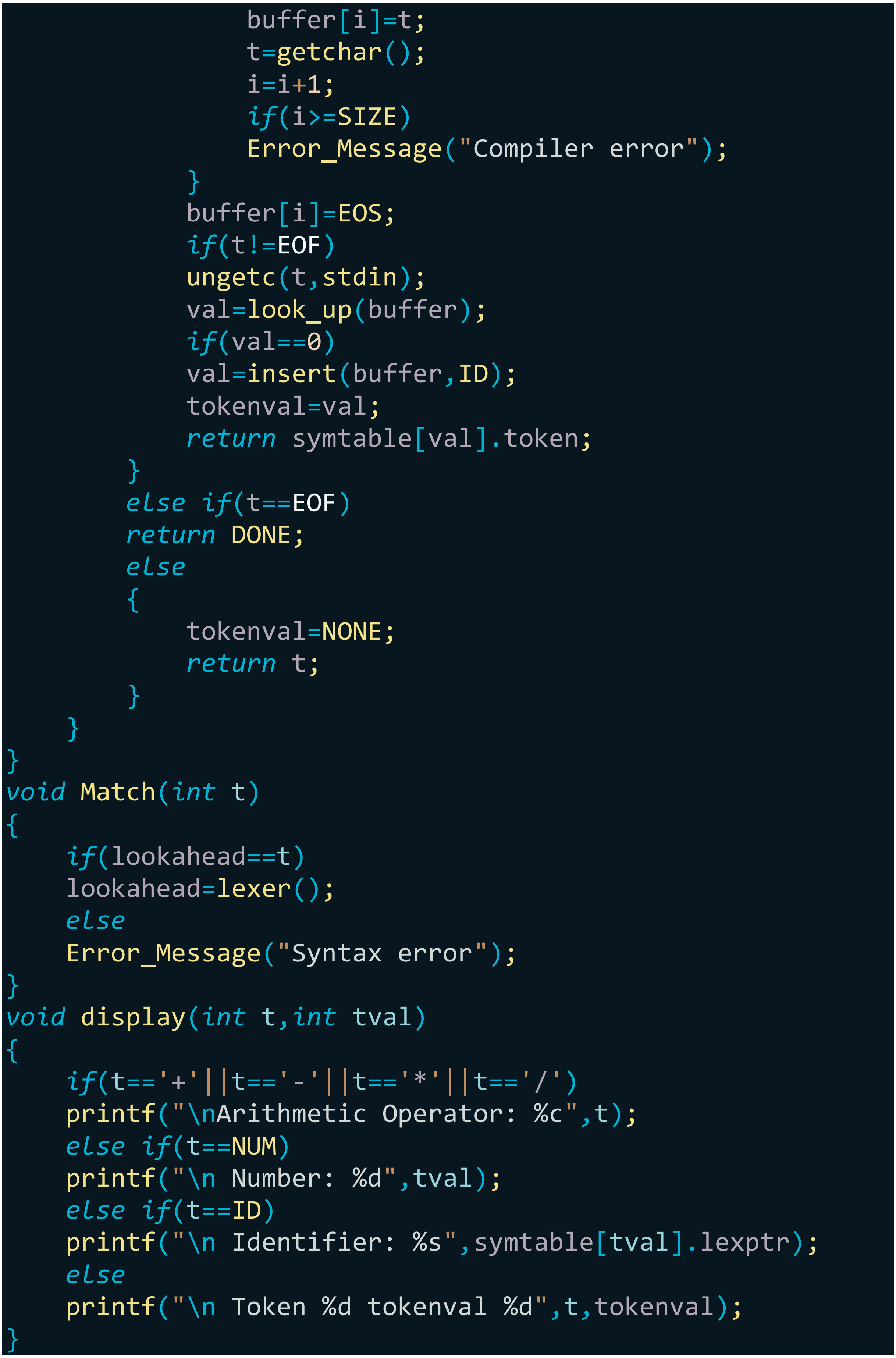
AIM: Design a predictive parser for a given language.

CODE:

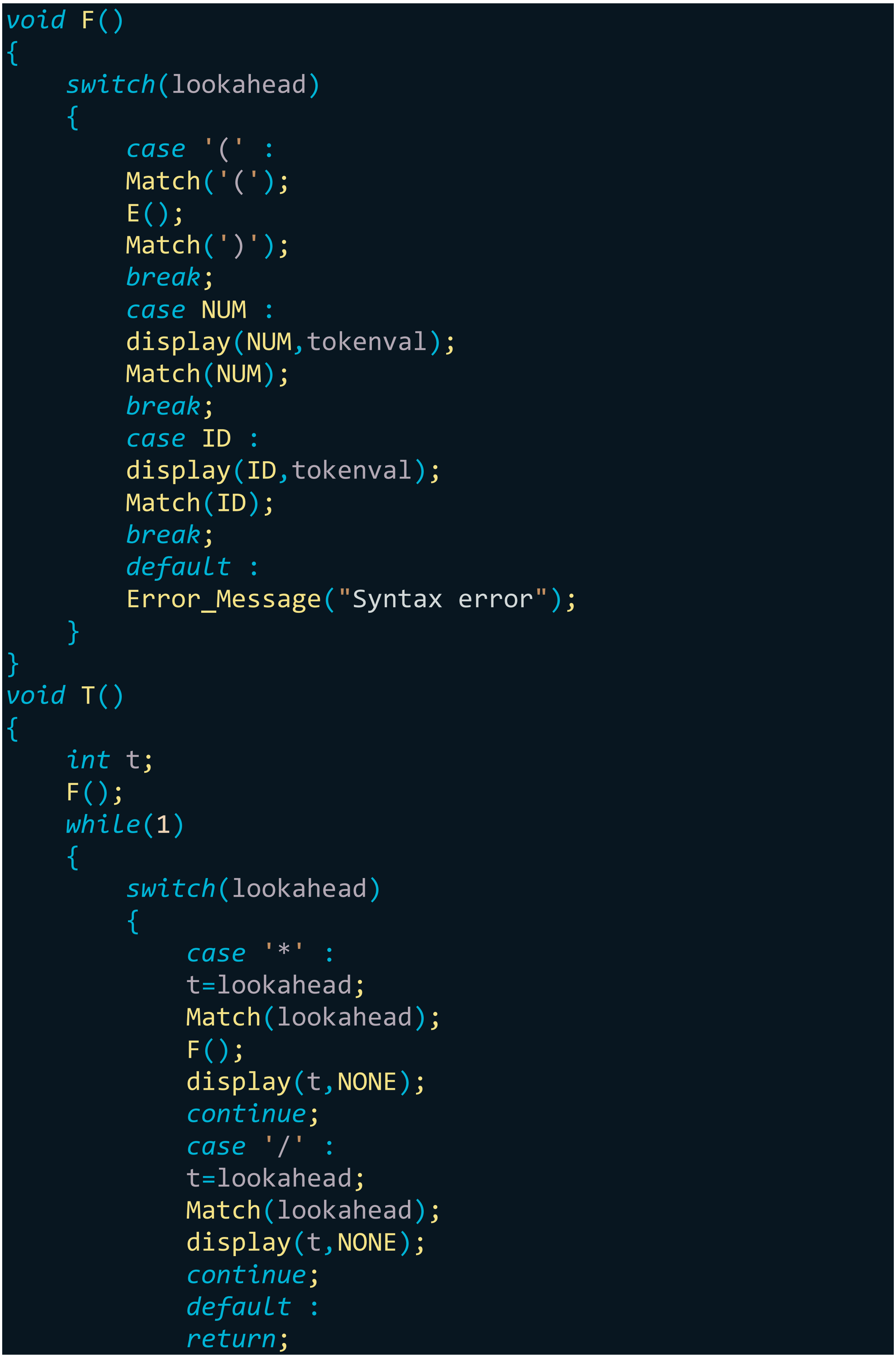
```
#include<stdio.h>
#include<ctype.h>
#include<string.h>
#include<stdlib.h>
#define SIZE 128
#define NONE -1
#define EOS '\0'
#define NUM 257
#define KEYWORD 258
#define ID 259
#define DONE 260
#define MAX 999
char lexemes[MAX];
char buffer[SIZE];
int lastchar=-1;
int lastentry=0;
int tokenval=DONE;
int lineno=1;
int lookahead;
struct entry
{
    char *lexptr;
    int token;
}
symtable[100];
struct entry
 keywords[]=
{"if",KEYWORD,"else",KEYWORD,"for",KEYWORD,"int",KEYWORD,"
float",KEYWORD,"double",KEYWORD,"char",KEYWORD,"struct",KE
YWORD,"return",KEYWORD,0,0
};
void Error_Message(char *m)
{
    fprintf(stderr,"line %d, %s \n",lineno,m);
    exit(1);
}
int look_up(char s[ ])
```



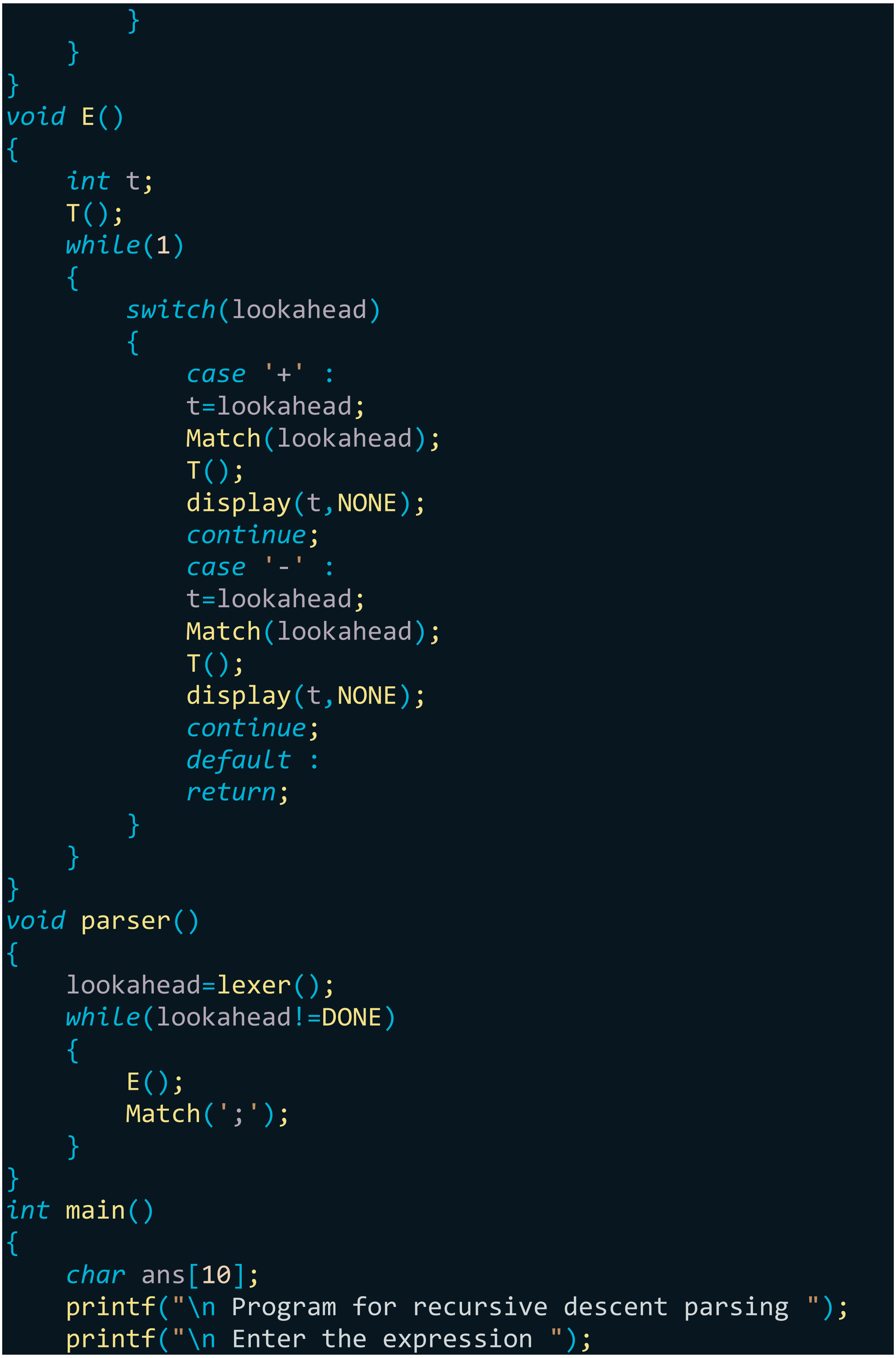
```
{
    int k;
    for(k=lastentry; k>0; k--)
    if(strcmp(symtable[k].lexptr,s)==0)
    return k;
    return 0;
}
int insert(char s[ ],int tok)
{
    int len;
    len=strlen(s);
    if(lastentry+1>=MAX)
    Error_Message("Symbpl table is full");
    if(lastchar+len+1>=MAX)
    Error_Message("Lexemes array is full");
    lastentry=lastentry+1;
    symtable[lastentry].token=tok;
    symtable[lastentry].lexptr=&lexemes[lastchar+1];
    lastchar=lastchar+len+1;
    strcpy(symtable[lastentry].lexptr,s);
    return lastentry;
}
int lexer()
{
    int t;
    int val,i=0;
    while(1)
    {
        t=getchar();
        if(t==' '||t=='\t');
        else if(t=='\n')
        lineno=lineno+1;
        else if(isdigit(t))
        {
            ungetc(t,stdin);
            scanf("%d",&tokenval);
            return NUM;
        }
        else if(isalpha(t))
        {
            while(isalnum(t))
            {
```



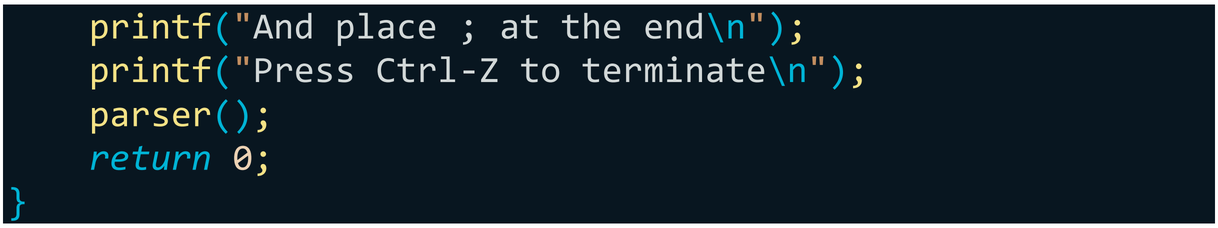
```
                buffer[i]=t;
                t=getchar();
                i=i+1;
                if(i>=SIZE)
                Error_Message("Compiler error");
            }
            buffer[i]=EOS;
            if(t!=EOF)
            ungetc(t,stdin);
            val=look_up(buffer);
            if(val==0)
            val=insert(buffer,ID);
            tokenval=val;
            return symtable[val].token;
        }
        else if(t==EOF)
        return DONE;
        else
        {
            tokenval=NONE;
            return t;
        }
    }
}
void Match(int t)
{
    if(lookahead==t)
    lookahead=lexer();
    else
    Error_Message("Syntax error");
}
void display(int t,int tval)
{
    if(t=='+'||t=='-'||t=='*'||t=='/')
    printf("\nArithmetic Operator: %c",t);
    else if(t==NUM)
    printf("\n Number: %d",tval);
    else if(t==ID)
    printf("\n Identifier: %s",symtable[tval].lexptr);
    else
    printf("\n Token %d tokenval %d",t,tokenval);
}
```



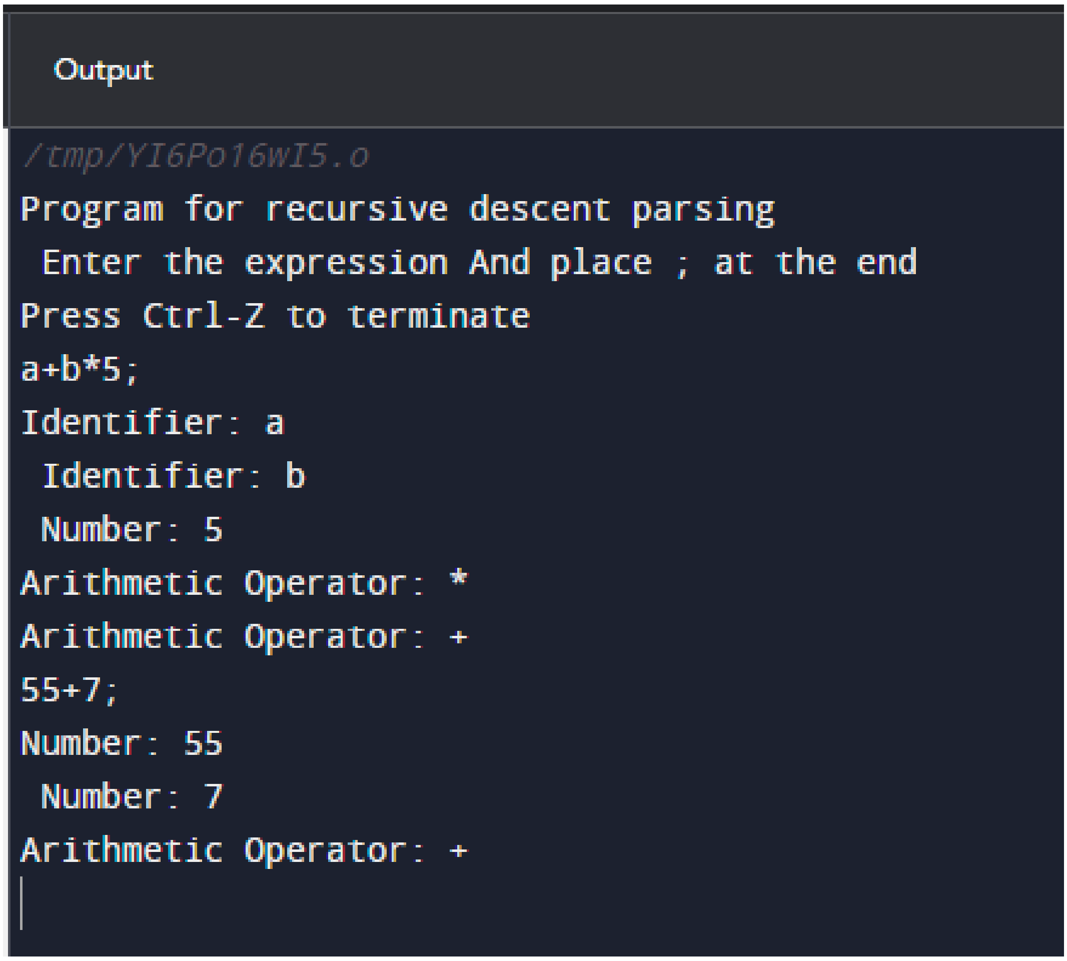
```
void F()
{
    switch(lookahead)
    {
        case '(' :
        Match('(');
        E();
        Match(')');
        break;
        case NUM :
        display(NUM,tokenval);
        Match(NUM);
        break;
        case ID :
        display(ID,tokenval);
        Match(ID);
        break;
        default :
        Error_Message("Syntax error");
    }
}
void T()
{
    int t;
    F();
    while(1)
    {
        switch(lookahead)
        {
            case '*' :
            t=lookahead;
            Match(lookahead);
            F();
            display(t,NONE);
            continue;
            case '/' :
            t=lookahead;
            Match(lookahead);
            display(t,NONE);
            continue;
            default :
            return;
```



```
        }
    }
}
void E()
{
    int t;
    T();
    while(1)
    {
        switch(lookahead)
        {
            case '+' :
            t=lookahead;
            Match(lookahead);
            T();
            display(t,NONE);
            continue;
            case '-' :
            t=lookahead;
            Match(lookahead);
            T();
            display(t,NONE);
            continue;
            default :
            return;
        }
    }
}
void parser()
{
    lookahead=lexer();
    while(lookahead!=DONE)
    {
        E();
        Match(';');
    }
}
int main()
{
    char ans[10];
    printf("\n Program for recursive descent parsing ");
    printf("\n Enter the expression ");
```



```
    printf("And place ; at the end\n");
    printf("Press Ctrl-Z to terminate\n");
    parser();
    return 0;
}
```



```
/tmp/YI6Po16wI5.o
Program for recursive descent parsing
 Enter the expression And place ; at the end
Press Ctrl-Z to terminate
a+b*5;
Identifier: a
 Identifier: b
 Number: 5
Arithmetic Operator: *
Arithmetic Operator: +
55+7;
Number: 55
 Number: 7
Arithmetic Operator: +
```