Exp No: 1

Date:

IMPLEMENT CODE TO RECOGNIZE TOKENS IN C

AIM:

To implement the program to identify C keywords, identifiers, operators, end statements like [], {} using C tool.

ALGORITHM:

- 1. Start
- 2. Define functions to check if a character is a delimiter, operator, or a valid identifier.
- 3. Define functions to check if a given string is a keyword, integer, real number, or a valid identifier based on certain conditions.
- 4. Define a function to extract substrings from the input string based on delimiter positions.
- 5. Define a parsing function that iterates through the input string character by character and identify substrings delimited by spaces or operators.
- 6. Check each substring for being a keyword, integer, real number, or a valid identifier and print the corresponding message.
- 7. Define the main function.
- 8. Initialize a string with the input expression.
- 9. Call the parsing function with the input string.
- 10. Print the results of the parsing, indicating whether substrings are keywords, integers, real numbers, or valid identifiers.

PROGRAM:

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

bool isDelimiter(char ch)

{

if (ch == '' || ch == '+' || ch == '-' || ch == '*' ||

ch == '/' || ch == ',' || ch == ';' || ch == '>' ||

ch == '<' || ch == '=' || ch == '(' || ch == ')' ||

ch == '[' || ch == ']' || ch == '{' || ch == '}')

return (true);

return (false);
}

bool isOperator(char ch)
```

```
{
         if (ch == '+' || ch == '-' || ch == '*' ||
                   ch == '/' \parallel ch == '>' \parallel ch == '<' \parallel
                   ch == '=')
                   return (true);
         return (false);
}
bool validIdentifier(char* str)
{
         if (str[0] == '0' || str[0] == '1' || str[0] == '2' ||
                   str[0] == '3' \parallel str[0] == '4' \parallel str[0] == '5' \parallel
                   str[0] == '6' \parallel str[0] == '7' \parallel str[0] == '8' \parallel
                   str[0] == '9' || isDelimiter(str[0]) == true)
                   return (false);
         return (true);
}
bool isKeyword(char* str)
{
         if (!strcmp(str, "if") || !strcmp(str, "else") ||
                   !strcmp(str, "while") || !strcmp(str, "do") ||
                   !strcmp(str, "break") ||
                   !strcmp(str, "continue") || !strcmp(str, "int")
                   | !strcmp(str, "double") | !strcmp(str, "float")
                   | !strcmp(str, "return") | !strcmp(str, "char")
                   || !strcmp(str, "case") || !strcmp(str, "char")
                   | !strcmp(str, "sizeof") | !strcmp(str, "long")
                   | !strcmp(str, "short") | !strcmp(str, "typedef")
                   | !strcmp(str, "switch") | !strcmp(str, "unsigned")
                   | !strcmp(str, "void") | !strcmp(str, "static")
                   | !strcmp(str, "struct") | !strcmp(str, "goto"))
                   return (true);
         return (false);
}
bool isInteger(char* str)
```

```
{
        int i, len = strlen(str);
        if (len == 0)
                 return (false);
        for (i = 0; i < len; i++) {
                 if (str[i] != '0' && str[i] != '1' && str[i] != '2'
                           && str[i] != '3' && str[i] != '4' && str[i] != '5'
                           && str[i] != '6' && str[i] != '7' && str[i] != '8'
                           && str[i] != '9' || (str[i] == '-' && i > 0))
                          return (false);
        return (true);
}
bool isRealNumber(char* str)
        int i, len = strlen(str);
        bool hasDecimal = false;
        if (len == 0)
                 return (false);
        for (i = 0; i < len; i++) {
                 if (str[i] != '0' && str[i] != '1' && str[i] != '2'
                           && str[i] != '3' && str[i] != '4' && str[i] != '5'
                           && str[i] != '6' && str[i] != '7' && str[i] != '8'
                           && str[i] != '9' && str[i] != '.' ||
                          (str[i] == '-' \&\& i > 0))
                          return (false);
                 if (str[i] == '.')
                          hasDecimal = true;
        return (hasDecimal);
char* subString(char* str, int left, int right)
{
```

```
int i;
        char* subStr = (char*)malloc(
                                  sizeof(char) * (right - left + 2));
        for (i = left; i \le right; i++)
                 subStr[i - left] = str[i];
        subStr[right - left + 1] = '\0';
        return (subStr);
}
void parse(char* str){
        int left = 0, right = 0;
        int len = strlen(str);
        while (right <= len && left <= right) {
                 if (isDelimiter(str[right]) == false)
                         right++;
                 if (isDelimiter(str[right]) == true && left == right) {
                         if (isOperator(str[right]) == true)
                                  printf("'%c' IS AN OPERATOR\n", str[right]);
                         right++;
                         left = right;
                 } else if (isDelimiter(str[right]) == true && left != right
                                  || (right == len && left != right)) {
                         char* subStr = subString(str, left, right - 1);
                         if (isKeyword(subStr) == true)
                                  printf("'%s' IS A KEYWORD\n", subStr);
                         else if (isInteger(subStr) == true)
                                  printf("'%s' IS AN INTEGER\n", subStr);
                         else if (isRealNumber(subStr) == true)
                                  printf("'%s' IS A REAL NUMBER\n", subStr);
```

```
 \begin{tabular}{ll} else if (validIdentifier(subStr) == true \\ \&\& isDelimiter(str[right-1]) == false) \\ printf(""%s' IS A VALID IDENTIFIER\n", subStr); \\ else if (validIdentifier(subStr) == false \\ \&\& isDelimiter(str[right-1]) == false) \\ printf(""%s' IS NOT A VALID IDENTIFIER\n", subStr); \\ left = right; \} \} \\ return; \} \\ int main() \{ \\ // maximum length of string is 100 here \\ printf("The expression is: float b= 0.5 * b;\n"); \\ char str[100] = "float b = 0.5 * b; "; \\ parse(str); // calling the parse function \\ return (0); \} \\ \end{tabular}
```

OUTPUT:

```
(kali@ kali)-[~/Documents/cdlab]
$ vi exp1.c

(kali@ kali)-[~/Documents/cdlab]
$ gcc exp1.c

(kali@ kali)-[~/Documents/cdlab]
$ ../a.out
The expression is: float b= 0.5 * b;'float' IS A KEYWORD
'b' IS A VALID IDENTIFIER
'=' IS AN OPERATOR
'0.5' IS A REAL NUMBER
'*' IS AN OPERATOR
'b' IS A VALID IDENTIFIER
```

RESULT:

Thus, a C program is implemented to identify C keywords, identifiers, operators and end statements.