

**Ex 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 the C tool.

### **ALGORITHM:**

- We identify the basic tokens in c such as keywords, numbers, variables, etc.
- Declare the required header files.
- Get the input from the user as a string and it is passed to a function for processing.
- The functions are written separately for each token and the result is returned in the form of bool either true or false to the main computation function.
- Functions are issymbol() for checking basic symbols such as () etc , isoperator() to check for operators like +, -, \*, / , isidentifier() to check for variables like a,b, iskeyword() to check the 32 keywords like while etc., isInteger() to check for numbers in combinations of 0-9, isnumber() to check for digits and substring().
- Declare a function detecttokens() that is used for string manipulation and iteration then the result is returned from the functions to the main. If it's an invalid identifier error must be printed.
- Declare main function get the input from the user and pass to detecttokens() function.

### **PROGRAM:**

```
#include <stdbool.h>
#include <stdio.h>
#include <string.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)
```

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{
    if (ch == '+' || ch == '-' || ch == '*' ||
        ch == '/' || ch == '>' || ch == '<' ||
        ch == '=')
        return (true);
    return (false);
}
bool validIdentifier(char* str)
{
    if (str[0] == '0' || str[0] == '1' || str[0] == '2' ||
        str[0] == '3' || str[0] == '4' || str[0] == '5' ||
        str[0] == '6' || str[0] == '7' || str[0] == '8' ||
        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'

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        && 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 <= 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) {

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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);

else if (validIdentifier(subStr) == true
&& isDelimiter(str[right - 1]) == false)
printf("%s' IS A VALID IDENTIFIER\n", subStr);

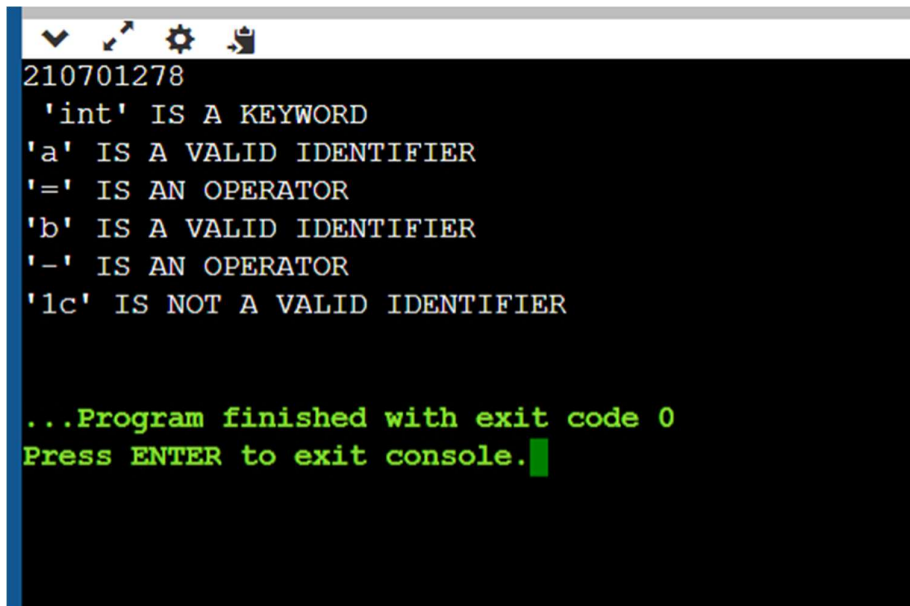
else if (validIdentifier(subStr) == false
&& isDelimiter(str[right - 1]) == false)
printf("%s' IS NOT A VALID IDENTIFIER\n", subStr);
left = right;
}
}
return;
}

```

```

int main()
{
printf("210701300\n ");
char str[100] = "int a = b + 1c; ";
parse(str);
return (0);
}

```

**OUTPUT:**A screenshot of a terminal window with a dark background and light green text. The window has a title bar with standard icons (checkmark, maximize, settings, close). The output text is as follows:

```
210701278
'int' IS A KEYWORD
'a' IS A VALID IDENTIFIER
'=' IS AN OPERATOR
'b' IS A VALID IDENTIFIER
'-' IS AN OPERATOR
'1c' IS NOT A VALID IDENTIFIER

...Program finished with exit code 0
Press ENTER to exit console.
```

**RESULT :**