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CSE A1 SECTION
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COMPILER DESIGN LAB

EXP 1 - LEXICAL ANALYZER

AIM :

To write a C++ program to show the implementation of a lexical analyzer

REQUIREMENTS :

1. Knowledge of the working of a lexical analyzer
2. Knowledge of the concept of tokens - identifiers , operators , keywords , digits , alphanumeric , etc
3. Online compiler GDB or any compiler like Dev C++

THEORY :

LEXICAL ANALYSIS :

The Lexical analyzer phase is the first phase of the compilation process. It takes source code as input. It reads the source program one character at a time and converts it into meaningful lexemes. Lexical analyzer represents these lexemes in the form of tokens.

TOKENS :
Lexemes are said to be a sequence of characters (alphanumeric) in a token. There are some predefined rules for every lexeme to be identified as a valid token. These rules are defined by grammar rules, by means of a pattern. A pattern explains what can be a token, and these patterns are defined by means of regular expressions.
In programming language, keywords, constants, identifiers, strings, numbers, operators and punctuation symbols can be considered as tokens.

ALGORITHM :

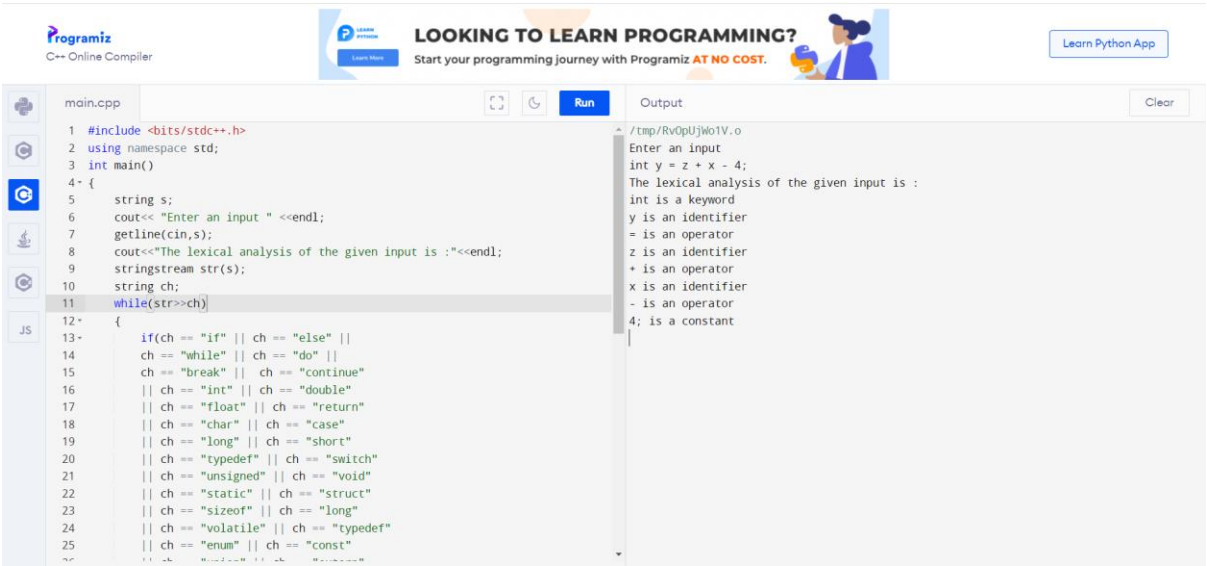
STEP 1 : To take an input string and use stringstream to read the given input word by word
STEP 2 : The tokens are to be identified so a while loop is created in which there are conditions to identify different types of input such as keywords , operators , identifiers ,etc.
STEP 3 : Once the given input is scanned character by character and sorted into different categories , the output window has to display the details.
STEP 4 : The output console shows the details of each input character - whether they are operators or identifiers , and hence the work of the lexical analyzer is done.

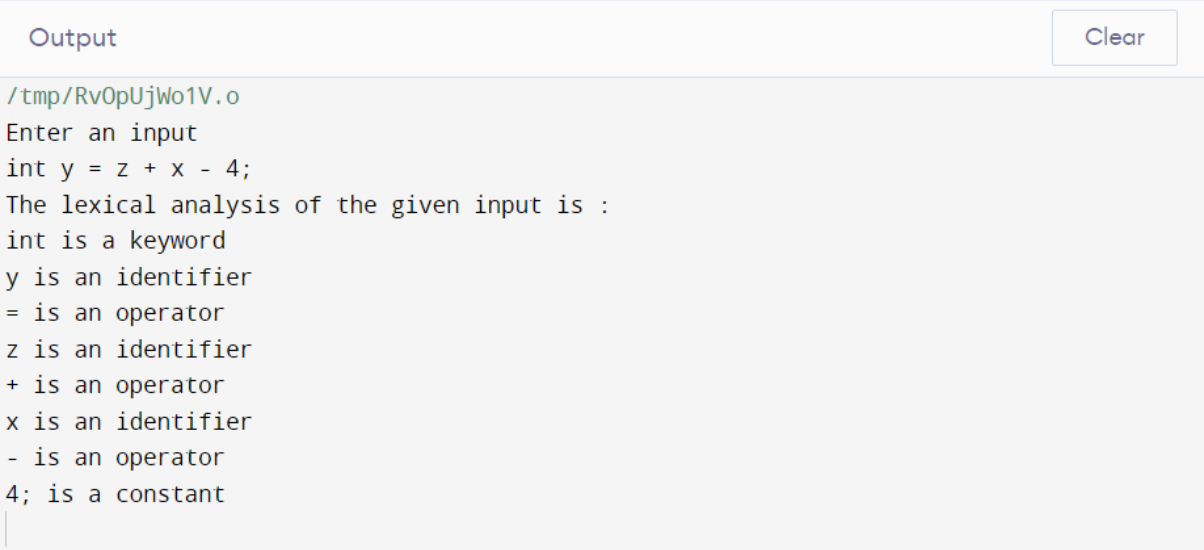
SOURCE CODE :

```
#include <bits/stdc++.h>
using namespace std;
int main()
{
    string s;
    cout<< "Enter an input " <<endl;
    getline(cin,s);
    cout<<"The lexical analysis of the given input is :"<<endl;
    stringstream str(s);
    string ch;
    while(str>>ch)
    {
        if(ch == "if" || ch == "else" ||
        ch == "while" || ch == "do" ||
        ch == "break" ||  ch == "continue"
        || ch == "int" || ch == "double"
        || ch == "float" || ch == "return"
        || ch == "char" || ch == "case"
        || ch == "long" || ch == "short"
        || ch == "typedef" || ch == "switch"
        || ch == "unsigned" || ch == "void"
        || ch == "static" || ch == "struct"
        || ch == "sizeof" || ch == "long"
        || ch == "volatile" || ch == "typedef"
        || ch == "enum" || ch == "const"
        || ch == "union" || ch == "extern"
        || ch == "bool")
        {
            cout<<ch<<" is a keyword"<<endl;
        }
        else if(ch[0] == ' ' || ch[0] == '+' || ch[0] == '-' || ch[0] == '*' ||
```

```
        ch[0] == '/' || ch[0] == '>' || ch[0] == '<' || ch[0] == '=' || ch[0] == '(' ||
ch[0] == ')' ||
        ch[0] == '[' || ch[0] == ']' || ch[0] == '{' || ch[0] == '}' ||
        ch[0] == '&' || ch[0] == '|')
        {
            cout<<ch<<" is an operator"<<endl;
        }
        else if(ch[0] == ',' || ch[0] == ';' || ch[0] == '.')
        {
            cout<<ch<<" is a separator"<<endl;
        }
        else if(isdigit(ch[0]))
        {
            cout<<ch<<" is a constant"<<endl;
        }
        else
        {
            cout<<ch<<" is an identifier"<<endl;
        }
    }
    return 0;
}
```

SCREENSHOT OF OUTPUT :





OBSERVATION :

Thus all the given inputs were scanned character by character and were segregated into their respective categories (like operators , identifiers , etc) which were shown in the output.

RESULT :

Thus we have successfully implemented a C++ program for lexical analyzer where each input character has been put in its respective category of tokens.