# Week 3 Lab Assignment: Lexical Analyzer

**Session: 2021 – 2025**

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## Rules Defined:

1. Function to check if the the string is a word
2. Function to check if the string is and operator
3. Function to check if the string is a punctuator
4. Function to check if the string is an identifier
5. Function to check if the string is a number
6. A tokernize function convert the code into different tokens, it works by checking the boundries using a space or identifieng a punctuation

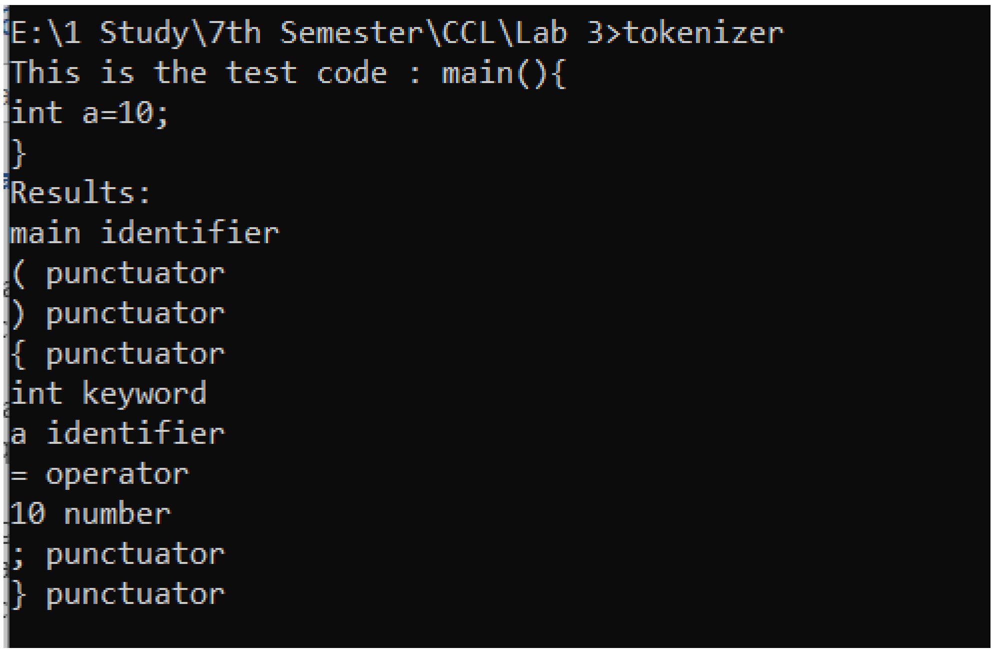
## Code:

```
#include <iostream>
#include <sstream>
#include <cctype>
#include <vector>
using namespace std;
bool isKeyword(string token){
    string keywords[]={"int","float","bool","if","else","while","do","for","return","void"};
    for(int i=0;i<10;i++){
        if(token==keywords[i]){
            return true;
        }
    }
    return false;
}
bool isOperator(string token){
    string operators[]={"+","-","*","=",">","<","<=",">=","==","!="};
    for(int i=0;i<10;i++){
        if(token==operators[i]){
            return true;
        }
    }
    return false;
}
bool isPunctuator(string token){
    string punctuators[]={",","{","}","(",";",")"};
    for(int i=0;i<6;i++){
        if(token==punctuators[i]){
            return true;
        }
    }
    return false;
}
bool isIdentifier(string token){
    if((token[0]>='a' && token[0]<='z')||(token[0]>='A' && token[0]<='Z')||token[0]=='_'){
        return true;
    }
    return false;
}
bool isNumber(string token){
    for(char c:token){
        if(!isdigit(c)){
            return false;
        }
    }
    return true;
}
void tokenize(const string& str, vector<string>& tokens){
    string token;
    for(char c:str){
        if(isspace(c)||ispunct(c)){
            if(!token.empty()){
                tokens.push_back(token);
                token.clear();
            }
            if(ispunct(c)){
                tokens.push_back(string(1,c));
            }
        } else{
            token+=c;
        }
    }
    if(!token.empty()){
        tokens.push_back(token);
    }
}

int main(){
    string test_code2="main(){\nint a=10;\n}";
    string test_code="for(int i=0;i<6;i++){\nif(token==punctuators[i]){\nreturn true;\n}\n}";
    cout<<"This is the test code : "<<test_code<<"\n";
    vector<string> tokens;

    tokenize(test_code,tokens);
    cout<<"Results: \n";
    int count=0;
    for(const string& token:tokens){

        if(isKeyword(token)){

            cout<<token<<" keyword"<<endl;
            count++;
        }
        else if(isIdentifier(token)){
            cout<<token<<" identifier"<<endl;
            count++;
        }
        else if(isOperator(token)){
            cout<<token<<" operator"<<endl;
            count++;
        }
        else if(isPunctuator(token)){
            cout<<token<<" punctuator"<<endl;
            count++;
        }
        else if(isNumber(token)){
            cout<<token<<" number"<<endl;
            count++;
        }
        else{
            cout<<token<<" is unknown"<<endl;
            count++;
        }

    }
    cout<<"Total tokens: "<<count<<endl;
    return 0;
}
```

## Screenshots of Outputs:

### Test code 1 Results:

In figure 1 you can identify that the code ran successfully, and it identified all the tokens successfully.

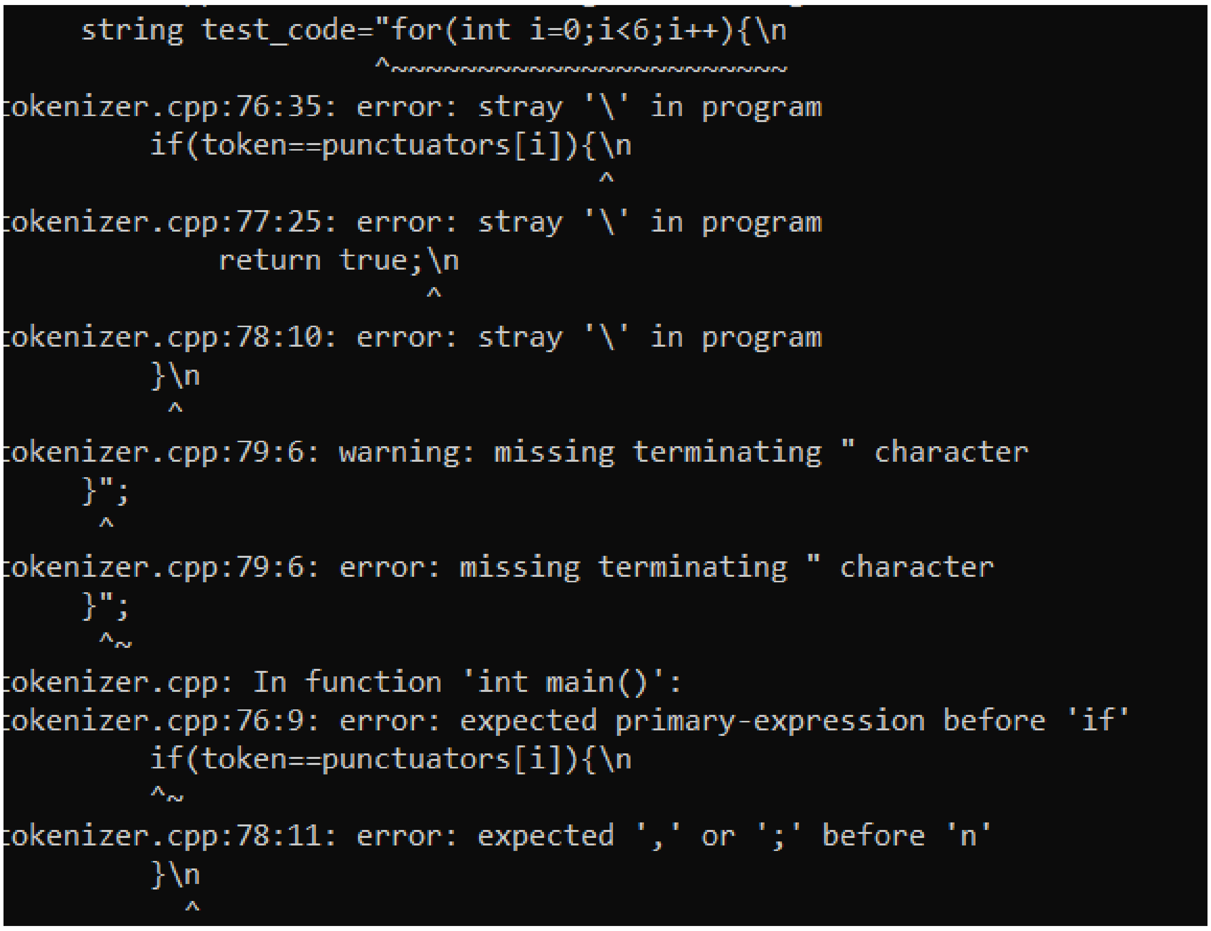


```
E:\1 Study\7th Semester\CCL\Lab 3>tokenizer
This is the test code : main(){
int a=10;
}
Results:
main identifier
( punctuator
) punctuator
{ punctuator
int keyword
a identifier
= operator
10 number
; punctuator
} punctuator
```

Figure 1

**Test code 2 Results:**

In figure 2, you can see the results of the second test, I tried to store the code without \n and added break lines, as it is against the rules of C++ therefore, I got lot of errors.

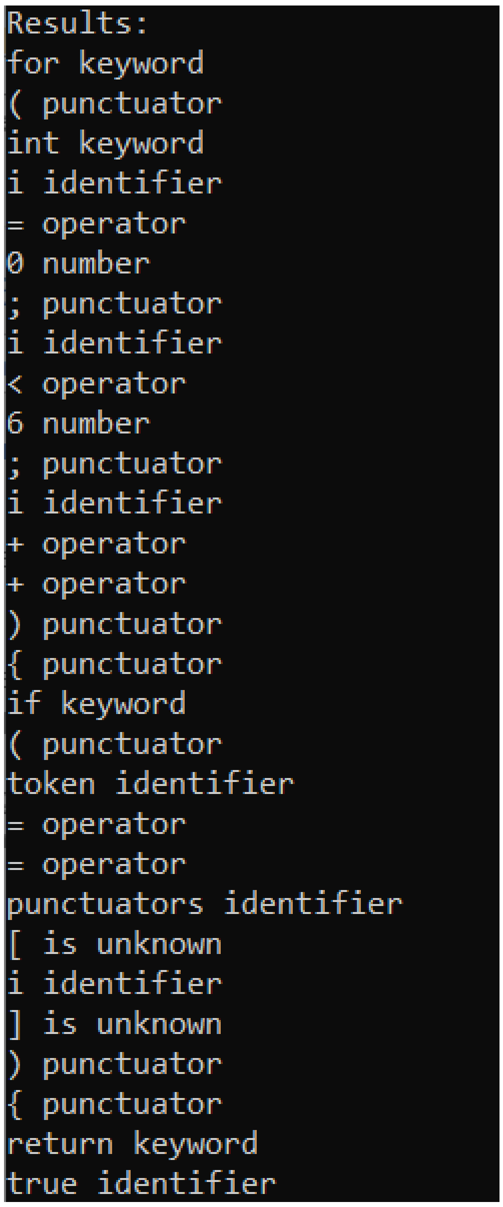


```
    string test_code="for(int i=0;i<6;i++){\n
                     ^~~~~~~~~~~~~~~~~~~~~~~~
okenizer.cpp:76:35: error: stray '\' in program
        if(token==punctuators[i]){\n
                                  ^
okenizer.cpp:77:25: error: stray '\' in program
            return true;\n
                        ^
okenizer.cpp:78:10: error: stray '\' in program
        }\n
         ^
okenizer.cpp:79:6: warning: missing terminating " character
    }";
     ^
okenizer.cpp:79:6: error: missing terminating " character
    }";
     ^~
okenizer.cpp: In function 'int main()':
okenizer.cpp:76:9: error: expected primary-expression before 'if'
        if(token==punctuators[i]){\n
        ^~
okenizer.cpp:78:11: error: expected ',' or ';' before 'n'
        }\n
          ^
```

Figure 2

**Test code 3 Results:**

You can see the from the figure 3, the same code I from the figure 2 I tried to run it by adding \n, instead of directly breaking the lines the code ran successfully.



```
Results:
for keyword
( punctuator
int keyword
i identifier
= operator
0 number
; punctuator
i identifier
< operator
6 number
; punctuator
i identifier
+ operator
+ operator
) punctuator
{ punctuator
if keyword
( punctuator
token identifier
= operator
= operator
punctuators identifier
[ is unknown
i identifier
] is unknown
) punctuator
{ punctuator
return keyword
true identifier
```

Figure 3