Virtual Lab Experiment

Design Lexical Analyzer in C/C++ -

```
#include<bits/stdc++.h>
using namespace std;
string keywords[]={"int","float","if","else","while","for"};
string operators[]={"<",">","<=",">=","==","=","+","-","++","--
"};
char punctuation[]={'(',')',',',';','{','}','[',']'};
vector<string> k,o,c,i;
vector<string> p;
/*
This function checks whether the given word is a keyword in
the list of keywords present.
If it is a keyword, it is added into the vector 'k'.
*/
void search_for_keywords(string a ,int flag)
{
if(a.size()==0)return;
int size=sizeof(keywords)/sizeof(keywords[0]);
for(int i=0;i<size;i++)
{
if(a==keywords[i])
{
k.push_back(a);
return;
}
}
if(!flag) i.push_back(a);
}
```

```
/*
This function checks if the given character is present in
the given array of punctuation marks.
If it is present, it is added into the vector 'p'.
*/
bool search_for_punctuation(char a )
{
//cout<<a;
int size=sizeof(punctuation)/sizeof(punctuation[0]);
for(int i=0;i<size;i++)
{
//cout<<punctuation[i];
if(a==punctuation[i])
{
//cout<<a;
string temp=" ";
temp[0]=a;
2
//cout<<temp;
p.push_back(temp);
return true;
}
}
return false;
}
/*
This function is to create the tokens of integers and
floatingpoint integers.
*/
void search_for_constants(string a )
{
```

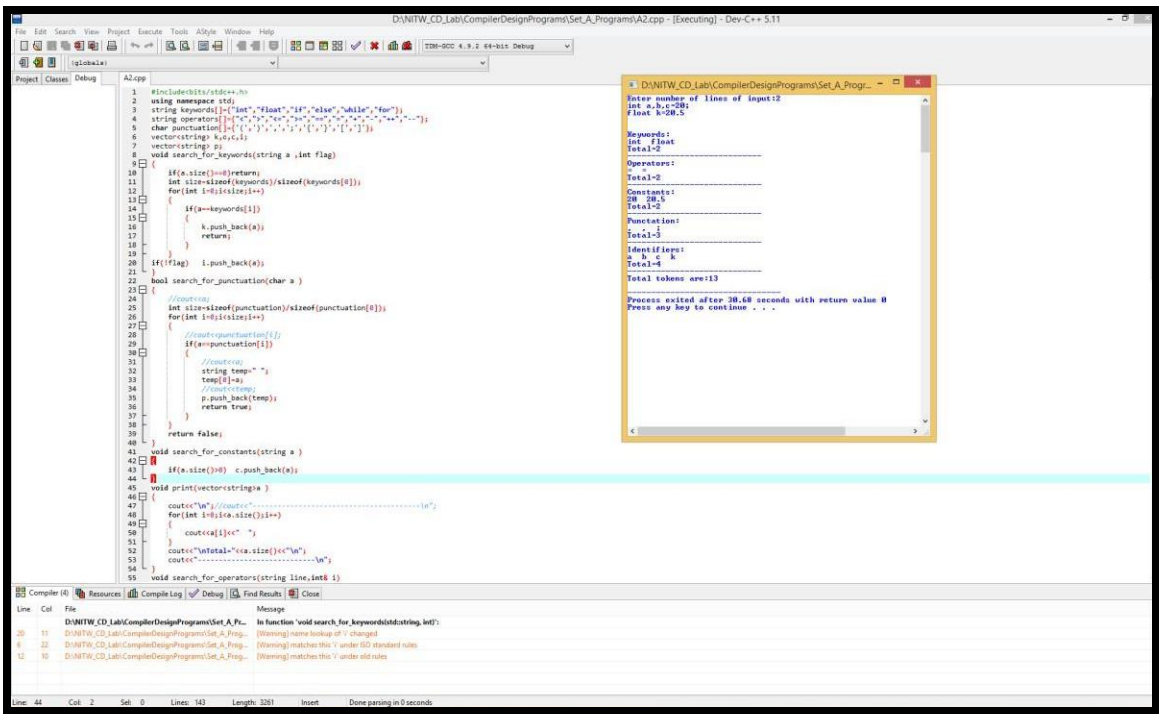
```
if(a.size()>0) c.push_back(a);
}
/*
This function prints the list/vector of strings and the
number of strings which is provided as the input.
*/
void print(vector<string>a )
{
cout<<"\n";//cout<<"----------------------------------------
-\n";
for(int i=0;i<a.size();i++)
{
cout<<a[i]<<" ";
}
cout<<"\nTotal="<<a.size()<<"\n";
cout<<"----------------------------\n";
}
/*
This function checks if the given input is a part of the
list of operators defined.
If it is a part of the list, it is added into the vector of
operators 'o'.
*/
void search_for_operators(string line,int& i)
{
// This is to check the operators which are composed of two
characters like '++', '+='.
string temp=line.substr(i,2);
//cout<<temp<<endl;
int size=sizeof(operators)/sizeof(operators[0]);
for(int j=0;j<size;j++)
```

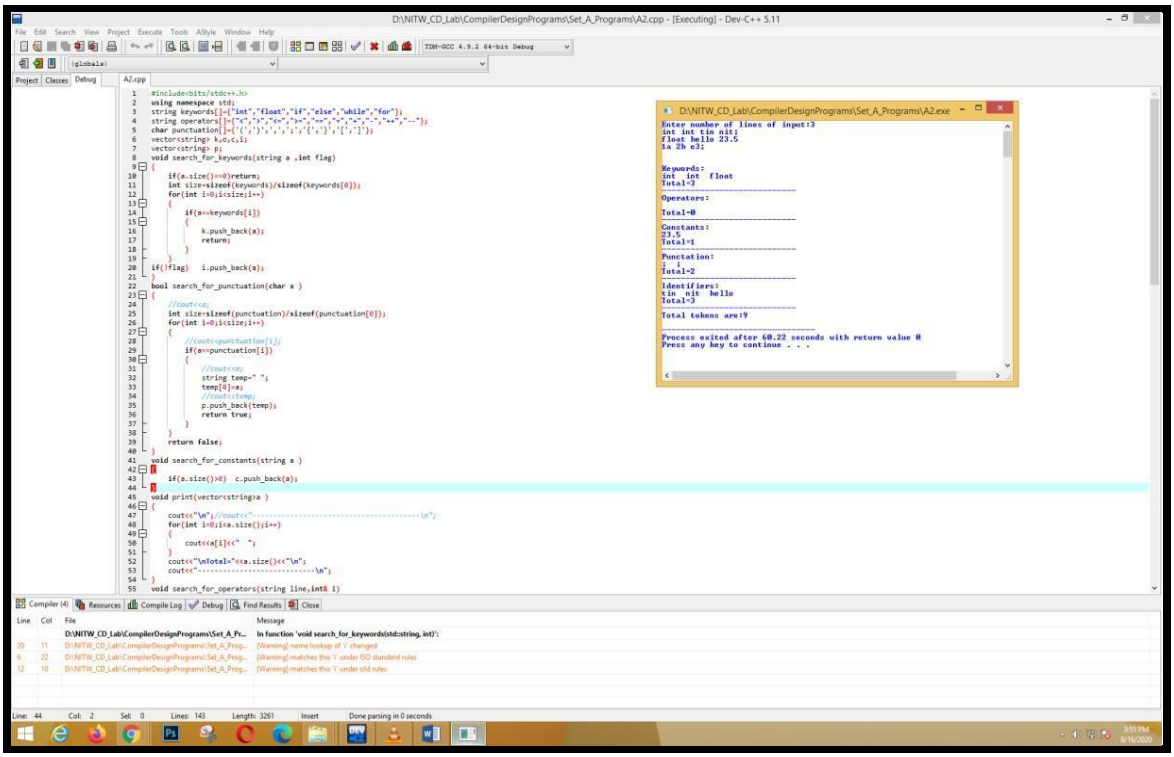
```
{
//cout<<punctuation[i];
if(temp==operators[j])
{
o.push_back(temp);i=i+1;
3
return;
}
}
// This is to check the operators which are composed of
only one character like '+', '-'.
temp=line.substr(i,1);
//cout<<temp<<endl;
for(int j=0;j<size;j++)
{
//cout<<punctuation[i];
if(temp==operators[j])
{
o.push_back(temp);
return;
}
}
}
int main()
{
cout<<"Enter number of lines of input:";
int n;
cin>>n;n++;
while(n--)
{
char arr[100];
```

```
cin.getline(arr,100,'\n');
string line=arr;
//cout<<line<<line.length();
int i;
string cur="";
string cur_num="";
int flag=0,flag2=0;
int no_of_dots=0;
for(i=0;i<line.length();i++)
{
char now=line[i];
if((now>='a'&&now<='z')||(now>='A'&&now<='Z'))
{ // Check for keywords and identifiers starts.
if(now=='e'&&flag==0&&no_of_dots>0){cur_num+=now;continue;}
if(cur_num.size()>0){flag2=1;}
flag=1;
cur+=line[i]; }
else if(now==' '){
// Found a delimiter, hence checking the stored
input till now for keywords and constants.
if(flag)search_for_keywords(cur,flag2);
4
else if(!flag2) search_for_constants(cur_num);
cur="";flag=0;cur_num="";no_of_dots=0; }
else if(now>='0'&&now<='9'||now=='.')
{ //Check for number starts. Keeping count of
number of '.'s.
if(now=='.'&&no_of_dots>0)cur_num="";
else if(now=='.')no_of_dots++;
if(flag)cur+=line[i];
else cur_num+=line[i];
```

```
}
else{
//cout<<now;
// If none of the above conditions pass, this
block of code checks for all of the keywords, numbers, operators
and punctuations.
if((now=='+'||now=='-
')&&flag==0&&cur_num.size()>0){cur_num+=now;continue;}
if(flag)search_for_keywords(cur,flag2);
else if(!flag2) search_for_constants(cur_num);
cur="";flag=0;cur_num="";no_of_dots=0;
if(!search_for_punctuation(now))
search_for_operators(line,i);
;//cout<<now;}}
//If still some are not matched, search for keywords and
numbers.
if(flag)search_for_keywords(cur,flag2);
else if(!flag2) search_for_constants(cur_num);
cur="";flag=0;cur_num="";}
cout<<"\n\nKeywords:";
print(k);cout<<"Operators:";
print(o);cout<<"Constants:";
print(c);cout<<"Punctation:";
print(p);cout<<"Identifiers:";
print(::i);
cout<<"Total tokens
are:"<<k.size()+o.size()+c.size()+p.size()+::i.size()<<"\n";
return 0;
}
```

Output -


D:\NITW_CD_Lab\CompilerDesignPrograms\Set_A_Programs\A2.cpp - [Executing] - Dev-C++ 5.11
D:\NITW_CD_Lab\CompilerDesignPrograms\Set_A_Progr...
Enter number of lines of input:2
int a,b,c=20;
float k=20.5
Keywords:
int float
Total=2
Operators:
Total=2
Constants:
20 20.5
Total=2
Punctation:
, , ;
Total=3
Identifiers:
a b c k
Total=4
Total tokens are:13
Process exited after 30.68 seconds with return value 0
Press any key to continue . . .


D:\NITW_CD_Lab\CompilerDesignPrograms\Set_A_Programs\A2.cpp - [Executing] - Dev-C++ 5.11
D:\NITW_CD_Lab\CompilerDesignPrograms\Set_A_Programs\A2.exe
Enter number of lines of input:3
int int tin nit;
float hello 23.5
ia 2b e3;
Keywords:
int int float
Total=3
Operators:
Total=0
Constants:
23.5
Total=1
Punctation:
; ;
Total=2
Identifiers:
tin nit hello
Total=3
Total tokens are:9
Process exited after 60.22 seconds with return value 0
Press any key to continue . . .