AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Faculty of Science and Technology

Report of

Compiler Design Section:

A

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Supervised by

NAZMUS SAKIB SHAN

Report on

Program to Determine Whether the Given Input Is Identifier or Not

Submitted by:

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Github Link: https://github.com/moumitaofficial/Compiler-Design

CODE:

```
#include <iostream>
#include <fstream>
#include <regex>
#include <string>
#include <sstream>
#include <vector>
using namespace std;

bool matchPattern(string input, string pattern)
{
   regex regexPattern(pattern);

   if (regex_match(input, regexPattern))
   {
      return true;
   }
   else
   {
      return false;
   }
}

bool checkDigit(char c)
{
   if(c=='0' || c=='1' || c=='2' || c=='3' || c=='4' || c=='5' || c=='6' || c=='7' || c=='8' || c=='9')
   {
      return true;
   }
   else
      return false;
}

bool isNumericConstant(string s)
{
   if((s[0] == '-' || s[0] == '+' || s[0] == '.') && s.length() == 1)
   {
```

```
        return false;
    }
    else
    {
        for(int i= 0; i<s.length(); i++)
        {
            if(s[i] == '-' || s[i] == '+' || s[i] == '.' || s[i] == 'e' || s[i] == '^')
            {
                i++;
            }
            if((!checkDigit(s[i])) && (s[i] != '^' || s[i] != 'e'))
            {
                return false;
            }
        }
        if(s[0] == '^' || s[0] == 'e')
        {
            return false;
        }
        return true;
    }
}

bool isDataType(string s)
{
    if(s == "int" || s=="double" || s=="long" || s=="bool" || s=="float" || s=="short" || s=="string" ||
s=="public" || s=="private" || s=="protected" || s=="static" || s=="virtual" || s=="const" || s=="void" ||
s=="signed" || s=="unsigned" || s=="return" || s=="char")
    {
        return true;
    }
    else
        return false;
}

bool isKeyWord(string s)
{
```

```
   if(s == "if" || s=="else" || s=="do" || s=="while" || s=="for" || s=="cin" || s=="cout" || s=="const")
   {
      return true;
   }
   else
      return false;
}

void showOperators(string s)
{
   int j =1;
   for(int i=0; i<s.length(); i++)
   {
      char c = s[i];
      if(c == '+' || c == '-' || c== '*' || c == '%' || c == '=')
      {
         cout<< "Operator " << j++<< ": " << c<< ", ";
      }
   }
}

bool isIdentifier(string s)
{
   int j =0;
   char c1 = s[0];
   int validity = 0;

   if(s.length()==0)
   {
      cout<< "String empty"<<endl;
      return false;
   }
   else
   {
      if(c1=='0' || c1=='1' || c1=='2' || c1=='3' || c1=='4' || c1=='5' || c1=='6' || c1 =='7' || c1=='8' ||
c1=='9')
      {
```

```
        cout<< "Identifiers cannot have numbers at the beginning. "<<endl;
        validity++;
      }
      else
      {
        for(int i = 0; i<s.length(); i++)
        {
          char c = s[i];

          if(c=='#' || c=='<' || c=='>' || c=='?' || c == '-' || c=='+'|| c=='*' || c=='/' || c=='%' || c=='$' ||
c=='&' || c=='^' || c=='@' || c==',' || c=='.' || c=='(' || c==')' || c=='"' || c==';' || c==':' || c=='|' || c=='='
|| c=='!' || c=='`' || c=='[' || c==']' || c=='{' || c=='}' || c=='\\')
          {
            cout<< "Error at index '" << i<<"'. Identifier cannot contain special character. "<<c<<endl;
            validity++;
          }
          if(c == ' ')
          {
            cout<< "Error at index '" << i<<"'. Identifier cannot contain empty spaces. "<<endl;
            validity++;
          }
          if(s == "int" || s=="double" || s=="long" || s=="bool" || s=="float" || s=="short" || s=="string"
|| s=="if" || s=="else" || s=="asm" || s=="new" || s=="switch" || s=="case" || s=="auto" ||
s=="operator" || s=="template" || s=="break" || s=="enum" || s=="public" || s=="private" || s=="this"
|| s=="protected" || s=="for" || s=="do" || s=="while" || s=="static" || s=="try" || s=="catch" ||
s=="throw" || s=="sizeof" || s=="virtual" || s=="const" || s=="void" || s=="signed" || s=="default" ||
s=="continue" || s=="goto" || s=="unsigned" || s=="return" || s=="char" || s=="extern" || s=="enum"
|| s=="struct" || s=="friend" || s=="inline" || s=="volatile" || s=="class" || s=="register" || s=="typedef"
|| s=="union")
          {
            cout<< "Identifier cannot be a keyword. "<<endl;
            validity++;
            break;
          }
        }
      }
    }
```

```
    if(validity == 0)
    {
        return true;
    }
    else
        return false;
}

bool isSingleLine(string s)
{
    for(int i=0; i<s.length(); i++)
    {
        char c = s[i];
        if(c == '/')
        {
            if(s[i+1] == '/')
            {
                return true;
            }
            else
            {
                return false;
            }
        }
    }
}

bool isMultiLine(string s)
{
    for(int i=0; i<s.length(); i++)
    {
        char c = s[i];
        if(c == '/')
        {
            if(s[i+1] == '*')
            {
                return true;
```

```
            }
            else
            {
                return false;
            }
        }
    }
}

bool isComplete(string s)
{
    for(int i=0; i<s.length(); i++)
    {
        char c = s[i];
        if(s[i-1] != '/' && c == '*')
        {
            if(s[i+1] == '/')
            {
                return true;
            }
            else
            {
                return false;
            }
        }
    }
}

void commentCheck(string s)
{
    if(isSingleLine(s))
    {
        cout<< "Single line comment. "<<endl<<endl;
    }
    else if(isMultiLine(s))
    {
        if(isComplete(s))
```

```
        {
            cout<< "Multiline comment. "<<endl<<endl;
        }
        else
        {
            cout<< "Multiline comment without end. "<<endl<<endl;
        }
    }
    else
    {
        if(matchPattern(s, "#include<+[A-Za-z]+>") || matchPattern(s, "using namespace +[A-Za-z]+;") ||
!isDataType(s) || isDataType(s) || isIdentifier(s) || !isIdentifier(s))
        {

        }
        else
        {
            cout<< "Invalid comment. "<<endl<<endl;
        }
    }
}

bool isHeader(string s)
{
    if(matchPattern(s, "#include<+[A-Za-z]+>") || matchPattern(s, "#include<+[A-Za-z]+>\\s*$"))
    {
        return true;
    }
    else
    {
        return false;
    }
}

bool isNamespace(string s)
{
    if(matchPattern(s, "using namespace +[A-Za-z]+;"))
```

```
    {
        return true;
    }
    else
    {
        return false;
    }
}

bool isMethod(string s)
{
    string s1, s2, s3;
    stringstream ss(s);
    ss >> s1;

    if(isDataType(s1))
    {
        if(matchPattern(s, "\\b(int|void|float|double|string|char)\\s+\\w+\\s*\\(.*?\\)\\s*\\{"))
        {
            return true;
        }
        else
        {
            return false;
        }
    }

};

bool isStatement(string s)
{
    string s1, s2, s3;
    stringstream ss(s);
    ss >> s1;

    if(isKeyWord(s1))
    {
```

```
        if(matchPattern(s, "\\s*\\if\\s*\\(.*?\\)\\s*\\{"))
        {
           return true;
        }
        else
        {
           return false;
        }
    }

};

bool isEnd(string s)
{
    if(matchPattern(s,".+?;\\s*$"))
    {
       return true;
    }
    else
       return false;
}

int main ()
{
    string line;
    string s;
    string s2;
    string s3;
    string s4;
    string s5;
    ifstream MyReadFile("lex_input.txt");

    while (getline(MyReadFile, line))
    {
       stringstream ss(line);
       ss >> s;
       ss >> s2;
```

```
    ss >> s3;
    ss >> s4;
    ss >> s5;
    cout << line << "   ";
    if(isHeader(line))
    {
       cout<< "Header. ";
    }
    if(isNamespace(line))
    {
       cout<< "Namespace. ";
    }

    showOperators(line);

    if(!isHeader(line) && !isNamespace(line) && line != "" && !isMethod(line) && !isKeyWord(s) && s != "return")
    {
       if(isKeyWord(s))
       {
          if(isDataType(s2))
          {
             isIdentifier(s3);
          }
          else
          {
             isIdentifier(s2);
          }
       }
       else if(isDataType(s))
       {
          isIdentifier(s2);
       }
       else
       {
          if(!matchPattern(line, "\\s*\\}\\s*$"))
          {
```

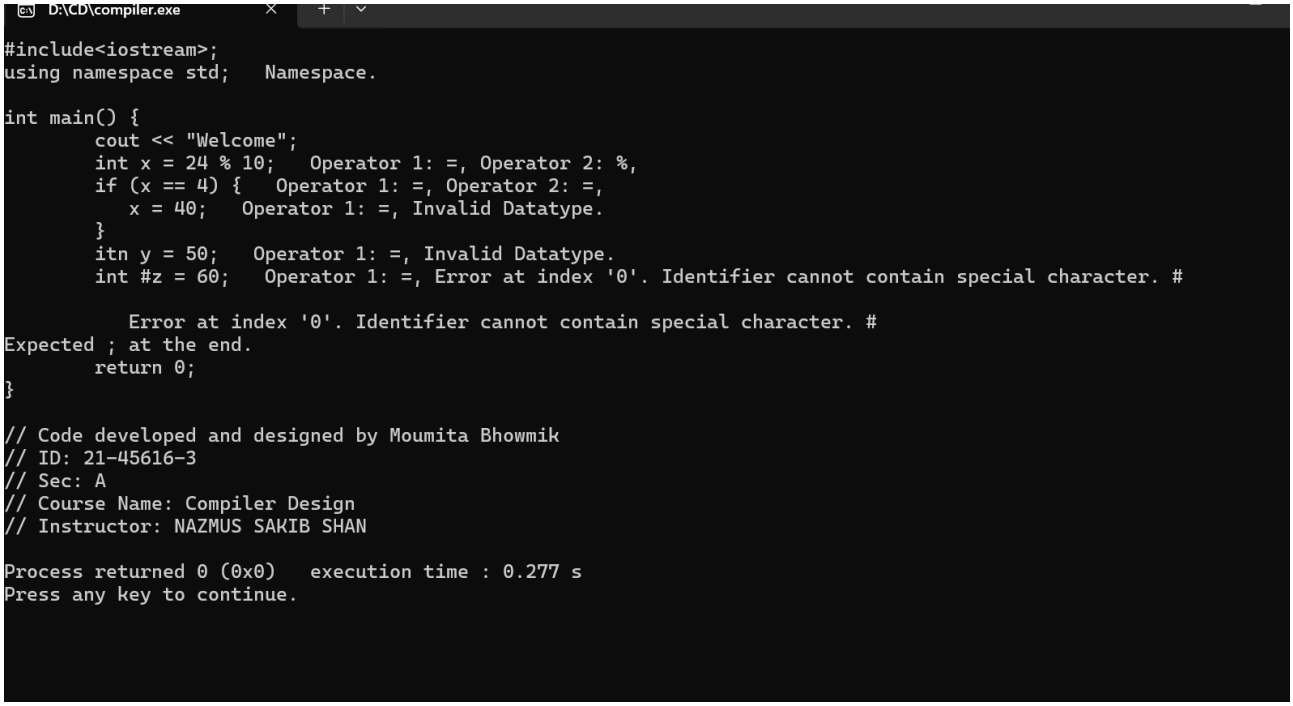
```
                cout<< "Invalid Datatype. ";
            }
        }
    }

    commentCheck(line);
    if(line != "" && !isHeader(line) && line != "}" && !isMethod(line) && !isStatement(line))
    {
        if(!isEnd(line) && !matchPattern(line, "\\s*\\}\\s*$"))
        {
            cout<< "Expected ; at the end. ";
        }
    }
    cout<<endl;

  }
  MyReadFile.close();
  cout << "// Code developed and designed by Moumita Bhowmik " << endl;
  cout << "// ID: 21-45616-3" << endl;
  cout << "// Sec: A" << endl;
  cout << "// Course Name: Compiler Design" << endl;
  cout << "// Instructor: NAZMUS SAKIB SHAN" << endl;


}
```

Output:


D:\CD\compiler.exe
#include<iostream>;
using namespace std;   Namespace.
int main() {
cout << "Welcome";
int x = 24 % 10;   Operator 1: =, Operator 2: %,
if (x == 4) {   Operator 1: =, Operator 2: =,
x = 40;   Operator 1: =, Invalid Datatype.
}
itn y = 50;   Operator 1: =, Invalid Datatype.
int #z = 60;   Operator 1: =, Error at index '0'. Identifier cannot contain special character. #
Error at index '0'. Identifier cannot contain special character. #
Expected ; at the end.
return 0;
}
// Code developed and designed by Moumita Bhowmik
// ID: 21-45616-3
// Sec: A
// Course Name: Compiler Design
// Instructor: NAZMUS SAKIB SHAN
Process returned 0 (0x0)   execution time : 0.277 s
Press any key to continue.