AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Faculty of Science and Technology

Report of

Compiler Design

Section:

A

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Supervised by

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Report on

Program to Determine Whether the Given Input Is Identifier or Not

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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))
      {
```

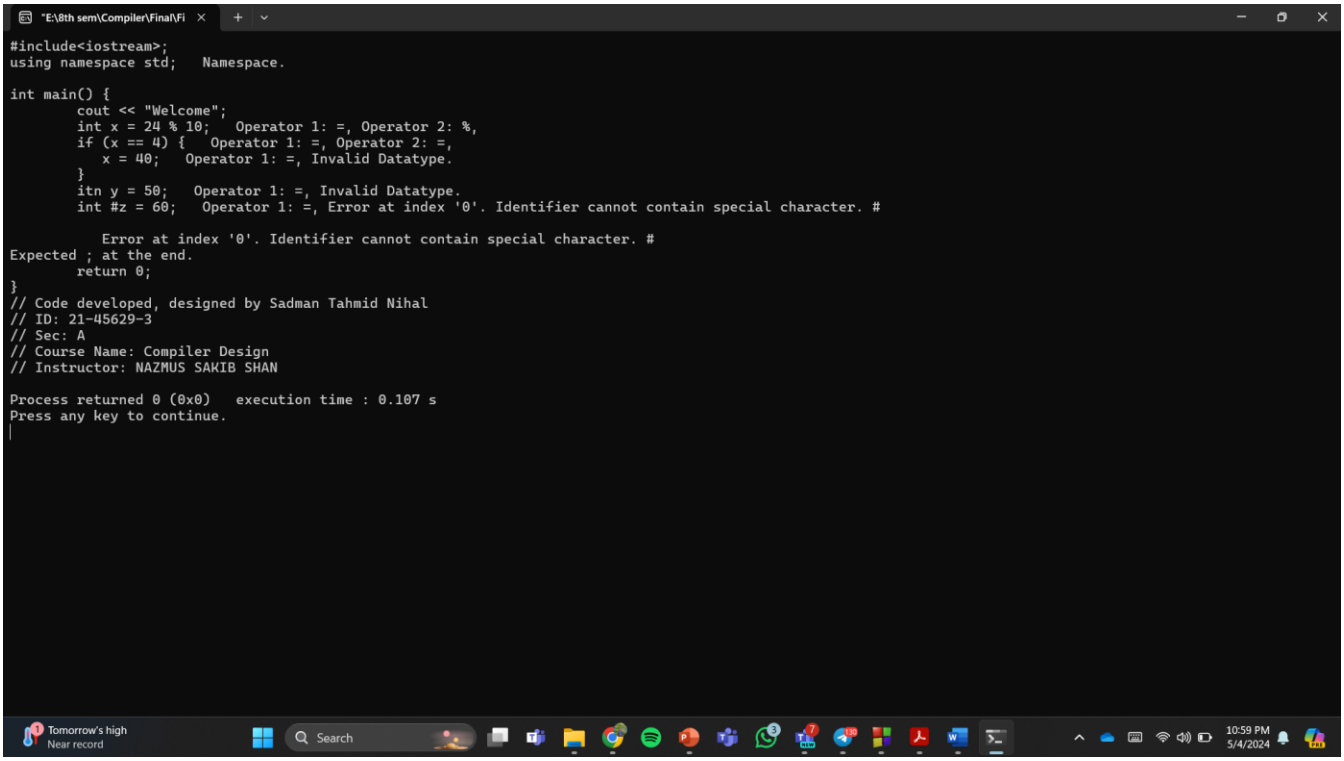
```
      }
else
      {
         cout<< "Invalid comment. "<<endl<<endl;
      }
   }
}

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 Mim,
Mahidul Islam" << endl;     cout << "// ID: 21-45620-3" << endl;     cout << "//
Sec: A" << endl;     cout << "// Course Name: Compiler Design" << endl;
cout << "// Instructor: NAZMUS SAKIB SHAN" << endl;
 }
```

Output:


"E:\8th sem\Compiler\Final\Fi
#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, designed by Sadman Tahmid Nihal
// ID: 21-45629-3
// Sec: A
// Course Name: Compiler Design
// Instructor: NAZMUS SAKIB SHAN
Process returned 0 (0x0)   execution time : 0.107 s
Press any key to continue.
Tomorrow's high
Near record
Search
10:59 PM
5/4/2024