Lab Assignment -1

Compiler Design Lab

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1. Write down the lexical analyzer to identify integer constant, arithmetic operator, assignment operator, and keyword from the given statement.

Code :

```
#include <stdbool.h>
#include <stdio.h>
#include <string.h>
#include   <stdlib.h>
bool isDelimiter(char
ch)
{
   if (ch == ' ' || ch == '+' || ch == '-' || ch == '*' || ch
      == '/') return (true);
   return (false);
}
bool isArithm(char ch)
{
      if (ch == '+' || ch == '-' || ch == '*' || ch == '/' || ch
            == '%') return (true);
      return (false);
}
bool isOperator(char ch)
{
   if (ch == '>' || ch == '<' || ch ==
      '=') return (true);
   return (false);
}
bool validIdentifier(char* str)
{
      if (str[0] == '0' || str[0] == '1' || str[0] == '2' || str[0] == '3' || str[0] ==
      '4' ||
         str[0] == '5' || str[0] == '6' || str[0] == '7' || str[0] == '8' || str[0] ==
'9' || isDelimiter(str[0]) == true)
            return
```

```
        (false); return
        (true);
}
bool isKeyword(char* str)
{
```

```
    if (!strcmp(str, "if") || !strcmp(str, "else") || !strcmp(str, "while") ||
!strcmp(str, "do") || !strcmp(str, "break"))
        return
    (true); return
    (false);
}
bool isInteger(char* str)
{
    int i, len =
    strlen(str); if (len
    == 0)
        return (false);
    for (i = 0; i < len; i++)
            {
      if (str[i] != '0' && str[i] != '1' && str[i] != '2'
            && str[i] != '3' && str[i] != '4' && str[i] != '5'
            && str[i] != '6' && str[i] != '7' && str[i] != '8'
            && str[i] != '9' || (str[i] == '-' && i
            > 0)) return (false);
    }
    return (true);
}
bool isRealNumber(char* str)
{
    int i, len = strlen(str);
    bool hasDecimal =
    false; if (len == 0)
        return (false);
    for (i = 0; i < len; i++)
            {
      if (str[i] != '0' && str[i] != '1' && str[i] != '2'
            && str[i] != '3' && str[i] != '4' && str[i] != '5'
            && str[i] != '6' && str[i] != '7' && str[i] != '8'
            && str[i] != '9' && str[i] != '.' ||
            (str[i] == '-' && i >
            0)) return (false);
        if (str[i] == '.')
            hasDecimal = true;
    }
    return (hasDecimal);
}
char* subString(char* str, int left, int right)
{
    int i;
    char* subStr = (char*)malloc(
                    sizeof(char) * (right - left + 2));
```

```
        for (i = left; i <= right; i++)
                subStr[i - left] = str[i];
        subStr[right - left + 1] = '\0';
        return (subStr);
}
```

```
int main()
{
    char str[500];
    printf("Enter a String
    : ");
    scanf("%[^\n]%*c",
    str); int left = 0, right
    = 0;
       int len = strlen(str);

       while (right <= len && left <= right)
             { if (isDelimiter(str[right]) ==
             false)
                   right++;

             if (isDelimiter(str[right]) == true && left ==
                   right) { if (isArithm(str[right]) == true)
                         printf("'%c' IS AN ARITHMETIC OPERATOR\n",
          str[right]); if (isOperator(str[right]) == true)
                         printf("'%c' IS AN OPERATOR\n", str[right]);
                   right++;
                   left = right;
                                                  }
                                                  else if (isDelimiter(str[right]) == true
= right))                                         && left != right || (right == len && left
                                                  !

                                                  {
                                                        char* subStr = subString(str,
                                                        left, right - 1);

                                                        if (isKeyword(subStr) == true)
                                                              printf("'%s' IS A
                                                              KEYWORD\n", subStr);

                                                        else if (isInteger(subStr) ==
                                                        true)
                                                              printf("'%s' IS AN
false)                                                        INTEGER\n", subStr);

                                                        else if (isRealNumber(subStr) ==
                                                        true)
false)                                                        printf("'%s' IS A REAL
                                                              NUMBER\n", subStr);
```

```
    else if (validIdentifier(subStr)
            == true &&
            isDelimiter(str[right - 1])
            == printf("'%s' IS A VALID
            IDENTIFIER\n", subStr);
            }
    }
    return (0);
}
```

```
else if (validIdentifier(subStr) ==
false && isDelimiter(str[right -
1]) ==
        printf("'%s' IS
NOT A VALID
IDENTIFIER\n",
subStr); left = right;
```

Output :

```
Enter a String : Hello if 50 + while - 69.420 >
'Hello' IS A VALID IDENTIFIER
'if' IS A
KEYWORD '50' IS
AN INTEGER
'+' IS AN ARITHMETIC
OPERATOR 'while' IS A
KEYWORD
'-' IS AN ARITHMETIC
OPERATOR '69.420' IS A REAL
NUMBER
'>' IS A VALID IDENTIFIER
```

- x - x - x - x -